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JULY/AUGUST 2000

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AIRVENTURE

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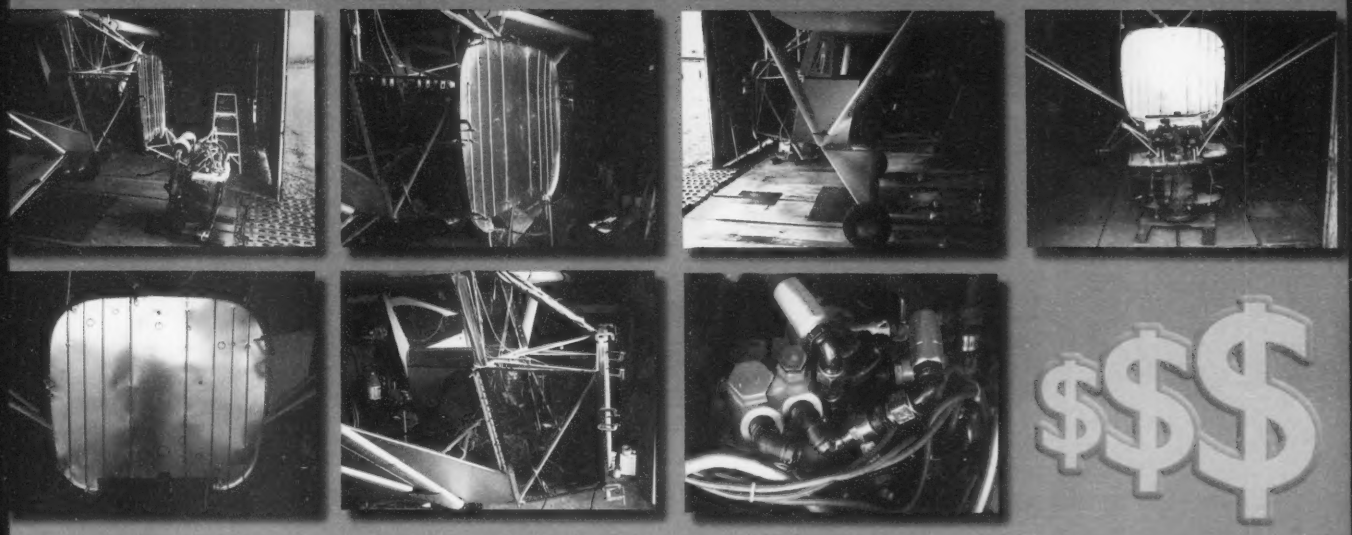
FRONT COVER:An aerobatic taste of EAA AirVenture 2000. (Mario Toscano photo)

BACK COVER: The perfect sunset: a seaplane at sea. (H. Dean Chamberlain photo)



Never Buy an Orphan

by H. Dean Chamberlain

Nineteen ninety nine was not a great year for me. The Y2K bug bit me twice. No, I am not taking about the computer bug. I am talking about two major impulse purchases I made last year. One was a new American-made sport utility vehicle (SUV). It seems it was not the "Grand" purchase I thought it would be. Although I may be exaggerating somewhat, I jokingly think it has spent more hours in the shop than on the road. The other was an aircraft that continues to cost me dollars in 2K amounts. Now I keep asking myself, "Y" me?

What does this have to do with aviation safety? Both impulse purchases have turned out to be major maintenance headaches. Since this is an FAA safety magazine, we won't discuss the SUV. The airplane, the "Orphan" as I have started calling it, is a post World War II Piper PA-22-135 *Tripacer*. Born in 1953, the little *Tripacer* is showing its age. I had seen it once before I bought it, and when asked one day if I wanted to buy it, I took about five seconds to say, "Okay." Rule Number One: Never buy an airplane with only five seconds thought. Maybe 10 seconds is okay, but never only five seconds. Rule Number Two: Always remember Rule Number One.

A year and my own annual inspection later, Rule Number One is still valid. Now I understand why one aircraft owner I know says it is somewhat insulting when someone offers to buy the gas for a flight. Even at the current prices for fuel, gas is the cheapest thing you can buy for an aircraft. The true costs are hangar fees—if you can find one, insurance, and required or hidden maintenance costs.

We are not talking about routine wear and tear—one must watch that "tear" word with a fabric-covered aircraft—but the hidden costs that lie in wait for the unwary. For years, I have read many and even written a few words on how to buy an aircraft. Such things as pre-purchase inspections done by your own qualified and knowledgeable mechanic familiar with that particular type of aircraft, detailed checks of FAA aircraft records located in Oklahoma City, a check for any current liens that can cloud a clear title, and a detailed review of asking and selling costs of similar aircraft discounted for age, hours, condition, and equipment are only a few of the things intelligent and well-prepared aircraft buyers should do before buying an aircraft. And of course the most important thing is to always buy an aircraft that matches your needs. For example, it is far cheaper to buy a good instrument aircraft rather than trying to make one out of an aircraft not designed for such operations. Working instruments are also nice to have. A detailed purchase contract is important as is any type of warranty.

All good advice, but hey, how much advice can one consider when making a five-second buying decision? Something about acting in haste and repenting in leisure comes to mind.

There are several truisms in life. One is to never go shopping for food when you are hungry. Another one is to never stop at an animal shelter on a rainy day, unless you want a pet. And last, but not least, is to never become emotionally involved with an aircraft. Airplanes are supposed to be mechanical devices that fly through the air on lots of money. They are not like a cute puppy looking for a new home. Airplanes don't get excited when they see you. Nor should one get excited about buying new toys or parts for an airplane. Or so I thought about my "Orphan" airplane and its needs. Like cute puppies that grow into expensive pets, so can a cute aircraft grow into an expensive toy, if you are not careful.

Such is the case of my Orphan. Although I may be accused of whining, as a writer and a recent aircraft buyer, I can now say that one should never take home an aircraft that one does not have the room or money to support. Like the adorable St. Bernard puppy, cute puppies can grow into big expensive dogs and so can a cute aircraft. And like the critically reported pet industry, not all aircraft are what they seem to be. The consumer, whether buying a motor vehicle or an aircraft, is the ultimate testing ground for all manufacturers. Whether by poor design, poor construction, or through poor maintenance, all buyers of aircraft need to learn as much about any potential maintenance problems involving their proposed purchase because once the ink is dry on the bill of sale, the new buyer will be the one paying for repairing or replacing bad or damaged parts or fixing those expensive design flaws or those hidden maintenance problems that no one told you about. The old expression, "Let the buyer beware," is as true in aviation as it is in any other purchase.

Such as with the Orphan. Although I violated every common sense rule ever written about buying an airplane, I can say I was smart enough to not be satisfied with the quality of the annual inspection finished just before I purchased the aircraft. For example, my first post annual engine run up check cost more than $300. The brakes wouldn't hold the aircraft at the specified engine run up RPM. How the inspector signed off the annual inspection without discovering the problem is beyond me. But as the new owner, I paid the bill for the repair.

I also discovered during my own first annual inspection done by a knowledgeable and trusted Airframe and Powerplant (A&P) mechanic with inspection authorization (IA) that my fears were justified. As we started checking the aircraft during a very detailed inspection, he found items that should have been found and corrected one or more inspections ago or little things that were just examples of poor or sloppy work.

As FAA Aviation Safety Inspector Mr. Bill O'Brien has written and talked about for years, the question of mechanic integrity comes to mind. In aviation more so than in many industries, flyers trust their lives and the lives of their passengers to the quality of work done by the mechanics on the ground. The old term "good enough for government work" does not mean much when you several thousand feet up in the air. You want things done right. Nor does it mean much to say, "Boy, am I glad I saved $50 on that used part," when you suddenly find yourself falling out of the sky because of that part. Having said that, as I read the messages on the Internet from other aircraft owners, there seems to be more than one who just want to get by. As a result, I think those who just want to get by also want the cheapest aircraft inspections and maintenance work they can find. Based upon some of what I have read, I often wonder what type of work has been done on some of the aircraft flying across the country and what types of parts are flying in those aircraft. The local hardware store comes to mind. There is another truism in life that you only get what you pay for. It seems some people don't want to pay much at all. Maybe we need a passenger warning on some aircraft that says, "Warning: maintained cheaply."

In defense of those quality shops and people who have done work for the Orphan's upgrades and repairs, I can honestly say that the quality of the work of a few have exceeded my own expectations. And when I pay the bill, my expectations are very high. Suffice to say, there are some great companies and people in aviation who still believe in quality and service. The challenge is finding those companies and people.

Whenever you buy an old aircraft, you need to know what you are buying. Is one model year better than another year's model? In aircraft both model years and serial numbers of specific aircraft are important. Maintenance items generally apply to specific model years or serial number ranges. For example, are there any outstanding maintenance items pending such as any FAA-mandated airworthiness directives that apply to your particular aircraft? One of mine will cost about $1,000 once the parts and labor are finally factored in. Then add in the cost of a new radio to replace the one the Federal Communication Commission said can no longer be used, and you have another thousand or two. Then factor in the cost of repairing damaged engine mounts discovered during the annual, and you can add in another couple of thousand dollars.

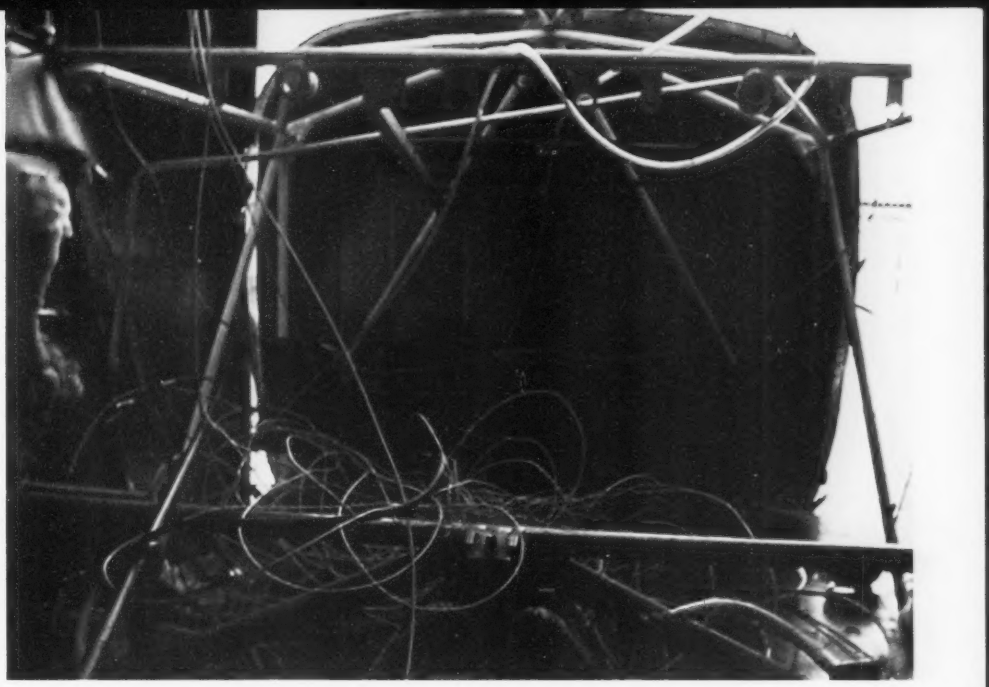
Then since the aircraft is now apart, it was logical to have those other items that are seldom taken off an aircraft inspected and overhauled as required, and the price tag continues to climb.

Soon the cost of inspections, required repairs, and equipment upgrades quickly exceeded the cost and value of the aircraft. The costs never stop adding up. Quickly one begins to understand why some pilots and boat owners have said, "The two happiest days of my life were the day I bought the (aircraft/boat) and the day I sold it."

Am I saying not to buy an old aircraft? No, what I am saying is that if you buy an old airplane, you need to do your homework to make sure you know what you are buying. Part of that homework is learning how some mechanics, shall I say (using my words), may not tell the complete truth about maintenance performed on the aircraft through, what I call, logbook omission. In the case of the Orphan, although the logbooks were available, I read them in detail after the purchase. I don't think they tell the complete history of the aircraft based upon what my IA found during my first detailed annual inspection. I think some mechanics may only make the minimum entries needed to meet the regulatory requirements.

As a writer, I understand the importance of words, and I realize that what is not said is as important as what is said. Now with all the computerization in the world, I think it would be great if all aircraft log entries were both complete and legible.

In defense of some mechanics, I



think it fair to say some owners may not want complete log entries, because if complete disclosure is made, the aircraft's value may decrease. It is a two-way street. A buyer needs complete disclosure to determine a fair market value, while the seller wants the most money for the aircraft. This constant market place conflict puts many professional mechanics with integrity between the proverbial rock and a hard place. No one wants to unknowingly buy a damaged aircraft, but a "no damage history" aircraft may in fact have an unrecorded damage history. It is just a question of how the work, if any, was "hidden" in the logs. The real question from a safety standpoint is not that an aircraft was damaged, but how well it was repaired. Properly repaired aircraft are more an economic issue than a safety issue.

So part of your homework involves talking to other owners and trusted mechanics to learn how to "read" both an aircraft and its logs.

Where does one start? The Internet is a great place to start. There are so many web sites available that at first it can be overwhelming. One of the best places to find information about a particular type of aircraft is to contact its "type" club, if one exists for the aircraft. In the case of the Orphan, the Short Wing Piper Club has been invaluable. In addition to the various aircraft specific type clubs, the Internet has many chat rooms dedicated to specific types of aircraft. The knowledge and personal experiences that many of the participants bring to the chat rooms can provide potential or new owners information that is priceless. And since price is an important part of any purchase, there are many price lists, want ads, and buying services available for the asking. There are many organizations of both pilots and aircraft owners that can help you.

The FAA is another great place to start. It publishes many manuals, booklets, and other types of reference materials that can help anyone buy an aircraft. The FAA Internet web site contains listings of current AD's, proposed AD's, and many other sources of data about any type of aircraft used in the U.S. It also has detailed reports about all of the type data sheets that apply to U.S. produced aircraft. For those who want to upgrade their aircraft, the FAA also lists those individuals and companies that have received FAA Supplemental Type Certificates (STC) that apply to modifications to an FAA type certificated aircraft.

There are two important types of FAA publications. The first is the various advisory circulars (AC), such as the various FAA authorized repair manuals that tell in great detail how to repair an aircraft. These are not designed to make the non-FAA certificated mechanic a certificated mechanic, but the information they contain can make the novice more understanding of what an FAA certificated mechanic is trying to tell him or her. It also gives you a basis for determining the quality of any work performed. The second important resource is the various FAA maintenance related orders and regulations that provide the basis for determining what maintenance is required, when it is required, and who can perform that maintenance.

I would feel remiss if I didn't mention one of the best information gathering places available: one of the many large aviation fly-ins held around the country such as the week-long Experiment Aircraft Association related events in Lakeland, FL, and Oshkosh, WI. Large aviation events such as these bring together in one place manufacturers, suppliers, vendors, subject matter experts, and just about every type of aircraft flying. And all of these folks and the aircraft owners are willing to tell you more than you ever wanted to know about just about everything. Plus you have a lot of fun learning and exploring. There is something exciting about being around just "plane" folks.

In case you are wondering why I call the *Tripacer* the "Orphan," the answer is simple. No one makes it or its engine anymore. But there are companies and some very knowledgeable people around the country who will help me maintain it during my life time. After all, like a cute puppy, once you take an adorable aircraft home, you have to love it and take good care of it for life. Its life or mine, I am not sure which. I am learning to be happy with it even if it does chew up a shoe now and then, or was that a disk brake or two? It doesn't matter. The saga continues...now why do people keep laughing when I say this is my first and last aircraft purchase? Can there be another truism in aviation?

Time will tell.

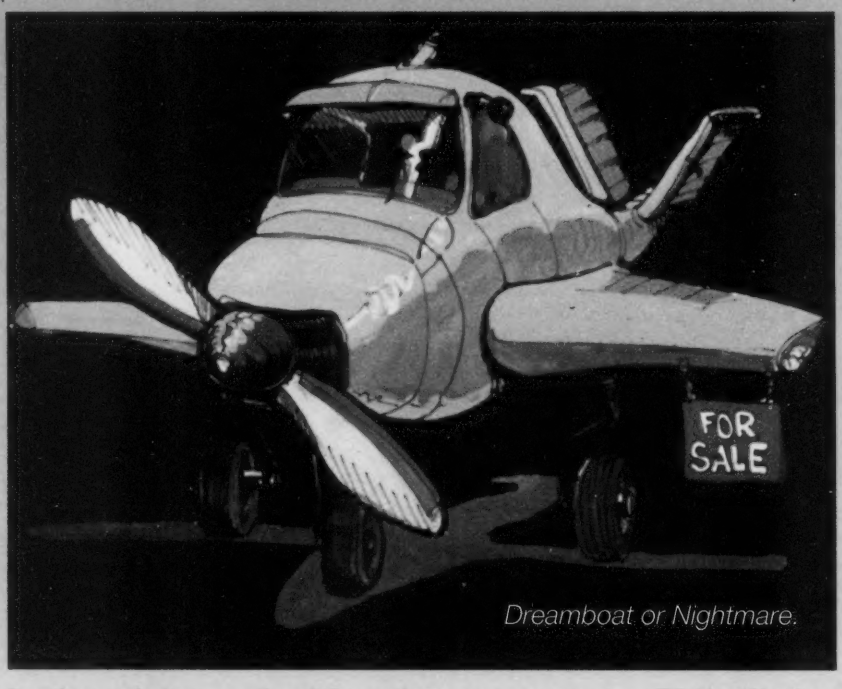
How To Buy a

by Bill O'Brien

There comes a time in every pilot's life, usually during a weak moment, that the idea of owning an airplane is seriously entertained. Once the pilot embraces this exciting image in the mind's eye of flying his or her own machine, the notion grows and grows until it becomes an all consuming passion. I base this observation on my own personal experience

To the best of my knowledge there is no known cure for this reverie. The addiction must run its course. Sadly, too many pilots buy airplanes to make a dream come true and wind up living with a winged nightmare nicknamed, "Jason" or the "Orphan" as mentioned in previous article.

Therefore in the interest of all mankind, my goal in writing this less than perfect article is to make pilots aware of what they should look for during a pre-buy inspection of your basic two- or four-place aircraft of 200 horsepower or less. The helpful hints and advice should work just as well for a high wing or a low-wing aircraft. In an attempt to maintain order, I have divided this article into three areas: Research, Inspection, and Flight Test.



Dreamboat or Nightmare.

RESEARCH

Once the decision has been made on what make and model dream machine you wish to purchase, the next logical step is to research that aircraft. First, get as much information as possible on the aircraft's capabilities and performance. Some obvious sources are the aircraft's flight manual, trade magazine articles, or bumming rides in identical make and model aircraft. Another information source you can check is the Internet The Internet is a well-spring of knowledge, and even the briefest search for web sites dedicated to a particular aircraft type will pull up web pages such as Cessna 170 Society, Beech *Bonanza*, Mooney, etc. These web sites can answer your questions on maintenance costs, availability of parts, the aircraft's good points or nasty habits, or any recurrent or pending Airworthiness Directives on the aircraft, engine, or appliances.

The next bit of information is very important! If you have access to the Internet, you can search on the FAA website for a copy of the FAA Type Certificate of the aircraft you are interested in at URL: http://www.faa.gov/fsdo/Bhm under the Airworthiness entry. If you don't have Internet access, buy or beg from your FBO or mechanic. The type certificate is the birth certificate of the airplane. It lists the applicable engines and propellers, speeds, gross weight, empty weight, etc. It also tells you what FAA regulation the aircraft was built to. Why? This might seem as boring as watching a glass of water, but what rule the aircraft was built to is a very important piece of information. For example, Type Certificate (TC) A30CE is for the Beech (now Raytheon Aircraft Company) Model 77 *Skipper*, a two-place trainer. The TC identifies the certification bases of the aircraft as Part 23 of the Federal Aviation Regulations. Part 23 is the latest certification regulations for general aviation airplanes and includes in those regulations mandatory retirement times. Note 3 in the Skipper's TC explains that these retirement times are contained in the Pilot's Operation Handbook and FAA Approved Flight Manual. What does this all mean? In the case of the *Skipper*, this means airframe carry through structures have a limited life and require mandatory replacement at 12,000 hours.

Airplane Part 1

Now take a look at a Cessna 150 type certificate. The C150 is a similar two-seat aircraft like the *Skipper*, but it does not have mandatory replacement times because it was built under the older Civil Aeronautics Regulations (CAR) 3 regulations. So it is important to the buyer to determine what is the certification bases of the aircraft before you buy, because the certification rules will determine future maintenance costs.

Now, just a word or two about the aircraft's Flight Manual. If the TC, requires a FAA Approved Flight Manual like our Beech *Skipper*, the Flight Manual must have the latest manual "revision" installed. A FAA Approved Flight Manual is part of the Type Design of the airplane, and an out-of-date manual does not meet type design requirements so the aircraft is technically unairworthy. A mechanic can check what the latest flight manual revision number should be.

Okay, now we can get down to business. Since we have read the Flight Manual and the TC and other information, we now have a good idea of the aircraft's capability. So now is the time to take a look at the airplane. Get a pencil and paper, a mechanic's inspection mirror, a 10-power magnifying glass, and an explosion proof flashlight.

Now before we rush off and look at the aircraft, we have to answer the question what are we looking for? The quick and dirty answer is; we are looking to see if the aircraft is airworthy. What is airworthy? Airworthy is when the aircraft meets its type design or properly altered condition and is in the condition for safe operation. The TC, I asked you to pick up, should list all of the required equipment and approved engines and propellers.

The aircraft paperwork should contain a history of all major alterations listed on individual FAA Form 337, Major Repair and Alteration. Until we get serious about a particular airplane I recommend that you hold off delving into the Form 337 paperwork review until we first determine if the aircraft is in a condition for safe operation.

Check the forest before the trees.

The pre-buy inspection is very similar to, but is much more detailed than, a pre-flight inspection. You must examine the aircraft from all sides—inside and out, and top to bottom. A good rule of thumb is to figure that it will take you a good two hours for each aircraft that you look at on the ground and another two hours for the test flight.

INSPECTION

First, I want you to look at the aircraft head on from about 30 feet away. I want you to get the big picture—in other words, first let's look at the forest before we check the individual trees. From your 30-foot vantage point check and see if the struts are of equal extension, any evidence of bad or mismatched paint, or signs of recent sheet metal skin repairs. See if all the antennas are on, including the ELT antenna. Check and see if the "N" number is the same on both sides. Don't laugh—it is not uncommon at all to have mismatched "N" numbers, especially after a paint job. Copy the "N" number down.

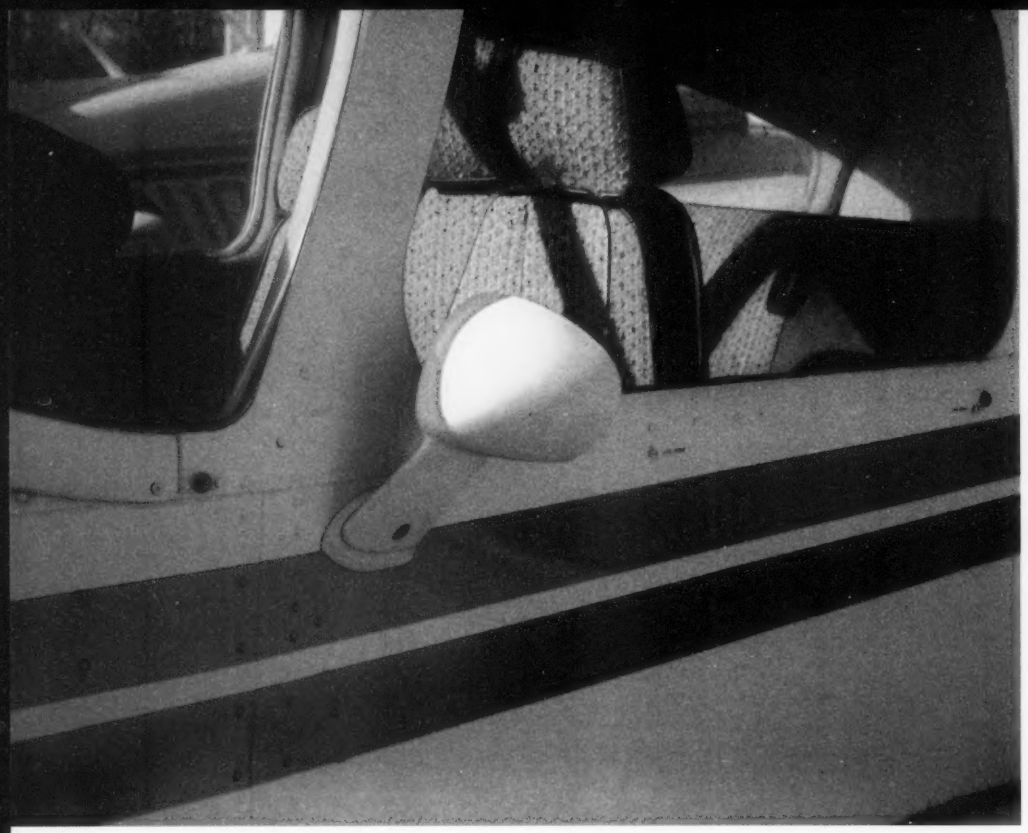
Slowly circle the aircraft, stopping on the sides and tail. Check for damage on the wings, fuselage, ailerons, wing tips, elevators/stabilizers, and rudder. Check the trim tabs to see if the tab is bent more than 10 degrees on any of the primary flight controls. If one is, you can bet the airplane has a rigging problem.

Paperwork

Next, assuming it is a U.S. regis-

FAA Websites

For those who have access to the Internet, there is a wealth of information available from the FAA. Once you have chosen your dream aircraft click onto <http://www.faa.gov/avr/air/airhome.htm> for available information on advisory circulars, Airworthiness Directives (AD), Regulatory and Guidance Library (RGL), Supplemental Type Certificates (STC), and Type Certificate Data Sheets and associated model information (TCDS - make/model).



Beware of owner approved alterations.

tered aircraft, open the aircraft's door and check and see if there is a current U.S. registration and airworthiness certificate. Check the "N" numbers on both certificates and make sure they match each other and the "N" number on the aircraft. Also copy down the owner's name and address and the aircraft's serial number that is on both certificates, you will need this information later. If the flight manual is handy, check the equipment list against the required equipment on the TC. Next check the flight manual and see if the weight and balance is correct. If the aircraft has a new radio package and a weight and balance form has the color of old teeth, you can be sure that nobody has computed the empty weight center of gravity (CG) lately. I have had owners tell me that the new radios are 10 to 12 pounds lighter than the old vacuum tube/power supply driven NARCO Mark 12 radios which were pretty much the general aviation (GA) standard in the late sixties and early seventies. So what is the problem? The problem is the instrument panel on most GA airplanes have a forward CG. If you remove fat radios and replace them with light-weight ones, the CG always goes aft! How far aft depends on the airplane. Since an aft CG is the worst case scenario to load an airplane, the current weight and balance must be dead accurate. If the paperwork doesn't match or is missing or just looks funny, don't waste your time with this one. Go to the next aircraft on your list.

Windows, Doors, and Seats

Finally we get to look at something other than paper, so the first thing you should look at is the door! A let down you say! Not really, a door can tell you a lot about the airplane. If it is hard to shut then maybe the door is warped from wind damage or the fuselage is twisted from high "G" loading or hard landings and the door will not align up properly. Check if there is a larger than normal door seal on the door. If there is a fat door seal on the door frame, it is almost a promise that the door leaks rain water or has a wind noise at cruise.

Next check the window. On most unpressurized aircraft the Plexiglas™ windows carry no structural load. You should be very concerned about how clear the windows are from both a safety and an economic point of view. Most of these aircraft that you will be looking at are parked out in the weather, year round. UV radiation from the sun will take its toll over time and the windows will yellow and begin to craze. Crazing is voids formed by a separation of the layers of plastic in the window. The voids in turn cause refraction of the light which the pilot sees as a sparking or sun devils when you are looking into the direction of the sun. This reduction in visibility can be a major problem when flying in busy airport areas. Replacement Plexiglas™ windows run about $100 for the side window, and pick a number from $200 on up to replace the windshield.

While we are still in the cabin, check the aircraft seats. After a cosmetic review, you should very carefully check the seat belts. Both the shoulder harness and lap belt should have a Technical Standard Order (TSO) marking on them. TSO means the webbing is aircraft quality. Also check the seat attach points and hardware with your mirror. Check the seat rail holes. This is where the seat pins engage the rails and lock your seat in a comfortable position. If the seat rail holes are elongated or appear to be scooped out the rails are bad. If the rails are bad, the seat will not stay put on take-off which will provide the pilot with a very interesting ride. Figure $1,000 for new rails and labor.

After the seats take a look at what is under the carpet. If the carpet is damp or wet with water then you confirmed that the cabin is not weather

proof. If you find red hydraulic fluid on or under the carpet, it is a sure sign that the toe/handbrake is leaking. If you spot a white power on the floor's sheet metal that white power is probably surface corrosion which is again a good indication that the doors or windows are leaking.

Fuel Management Systems

Next, check the fuel selector. Every pilot I know, dutifully check left and right tanks and then leaves it on both, if so equipped. Very few pilots check the fuel selector in the off position. This is the only control a pilot has that shuts the fuel off on the cabin side of the firewall. If you have an in-flight fire caused by a broken fuel line, closing the throttle and the mixture controls would not stop the fuel from piddling on a hot exhaust pipe or muffler. I recommend that you first check if the fuel value is properly marked and make a mental note that you check the off position of the valve before the flight test so you know for sure you can shut off the fuel. While you have the chance, slowly move the throttle, mixture, propeller, carb heat or alternate air from off to on and back again. You are looking for any binding or sticking which means the soft metal inside control wire is rubbing against the stainless steel outer housing. No need to tell you which one will win that battle in the long term. If a control sticks, have a mechanic look at it before you fly.

Instruments and Avionics

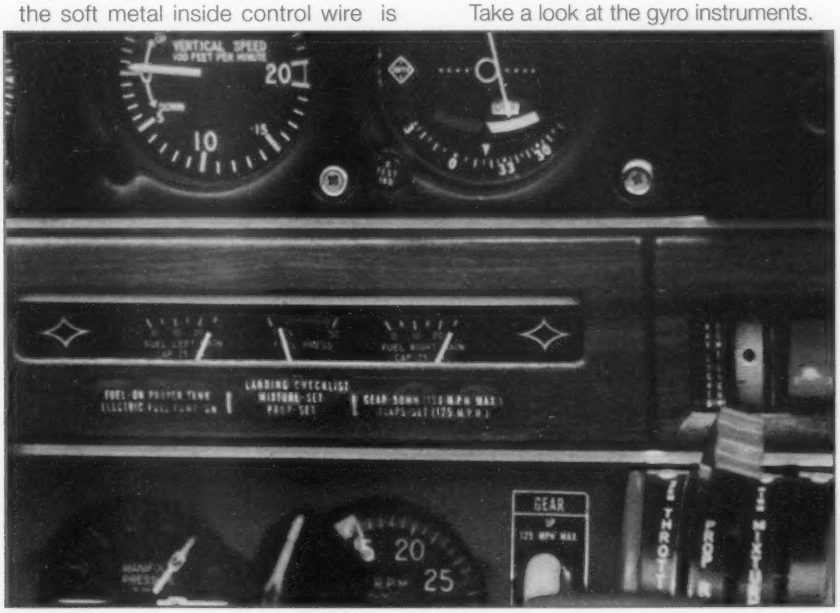
Now take a look at the instrument panel. The panel contents is approximately 1/6 of the total cost of the aircraft. First, make sure the instruments are securely attached. Check under the panel for loose wires and vacuum hoses that may bind up the movement of the flight controls. Now look at your old friend the airspeed indicator. Check and see if the marking on the airspeed indicator agree with the speeds listed in the Flight Manual. It is not unusual to find an airspeed indicator that is for a Cessna 172 in a Cessna 150. The instruments are identical, except for the airspeed markings. Now check and see if the standby wet compass look serviceable and has a compass correction card filled out. If the card is missing or has no heading corrections on it, you are also looking at four hours of labor for two mechanics to take the aircraft out and "swing the compass" to make the aircraft VFR legal.

Take a look at the gyro instruments. Most pilots are aware of how to check a gyro for precession in flight. But here is a little tip on how to tell if the instruments are having problems just sitting there. Check if you see a haze surrounding or partially surrounding the glass of either instrument. The haze is really dirt that is on the bezel glass and inside the gyro that has been sucked into the instrument because the "O" ring seal between the glass and the gyro instrument has been breached. The dirt is being sucked into the instrument because it is easier to get air from a breach in the seal then get filtered air from the instrument regulator. Haze will tell you the gyro instrument(s) are not long for this world. Overhaul cost vary, but you can figure on overhaul costs starting at $350 for the directional gyro (DG) and $450 for the artificial horizon.

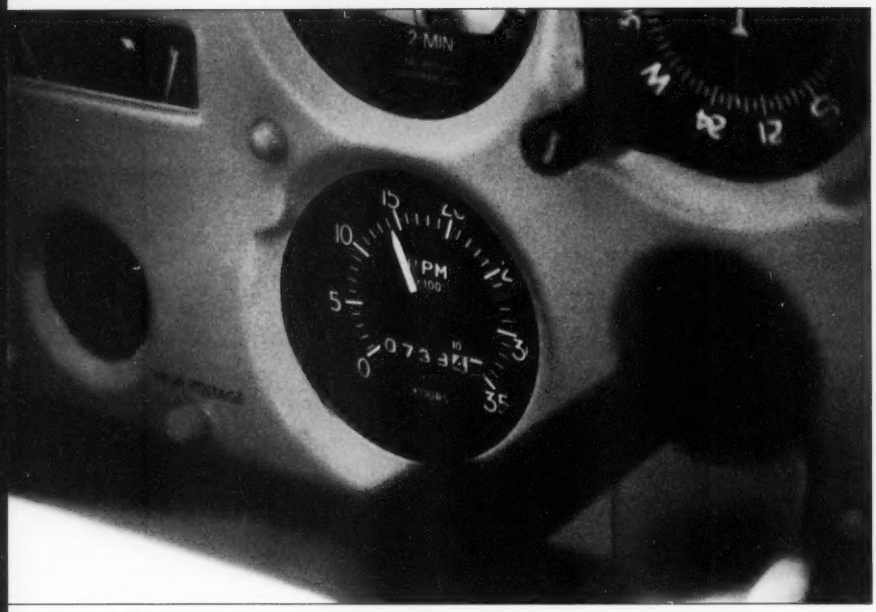
Altimeters are easy to check. Make sure, after you dial in the local barometric reading in the Kollman's window, that the indicated altitude matches the field elevation. You can also check if the altitude select knob moves the hands without sticking or binding. An altimeter overhaul costs approximately $150 to $300 depending on type.

Next instrument to check is our good friend the rate of climb or if you are a card carrying pessimist, the rate of decent instrument. Many of these instruments tend to read plus or minus 50 to 100 feet. While many fly with instrument reading a 50 foot rate of climb on the ramp, not many of us would want to rely on a non-calibrated rate of climb during a instrument check ride with the FAA. Calibration by an instrument repair station usually costs around $100, plus or minus $20.

The turn coordinator (TC), or the older turn and bank indicator, usually is an electrical driven gyro which shows the degree of bank the aircraft is in either with a pointer or an stylized airplane. A glass tube with a free floating ball inside shows if the aircraft is in a coordinated turn. To check the TC instrument on the ground, turn on the master switch and just listen! If the gyro sounds like a tin can filled with marbles, the gyro bearings are going



Fuel gauges are accurate only when empty.



This tach reads low — Does yours?

bad and a replacement instruments will cost in the $250 plus range or more than double the base price depending if the gyro has a wing leveler electrical pick off installed.

Next item you can check is the emergency locator transmitters (ELT). If you have a remote ELT switch in the cabin, by regulation you must wait until five minutes after the hour to activate the ELT—unless you want the Civil Air Patrol and airport "ELT" police driving up to your airplane. Turn on a radio and listen for the emergency signal on 121.5 MHz. If you have a strong signal the next thing that you should check is compliance with FAR § 91.207, the annual ELT inspection. This is separate from the FAR § 91.409, annual inspection requirement. So make a mental note to check the log book entry for the ELT inspection. Now it is time to further explore the radio package in the airplane. If you have more than two radios, then the mark of a good avionics installation is an avionics audio panel and an avionics on/off switch. The best you can do on the ground to check the radios is call the ground control or UNICOM. Obviously, the best way to check the radios and navigation aids is during the flight test.

Next in line is the lower instrument panel. If the battery is up to it, check the landing and taxi lights, position and rotating beacon or strobe. Check the interior and panel lights. Make sure the circuit breakers or fuses are properly marked and operable. Exercise the flaps and trim(s) and check for smooth operation and that they work as advertised. Next, check the fuel gages. You might be surprised to know that by FAA regulations applicable to both CAR 3 and FAR 23 aircraft the fuel gauges need only to be accurate when reading empty. So write down the fuel gauge readings and later visually check the fuel level in the tanks. Use a fuel tank dip stick, if necessary, to ensure accuracy.

There is another instrument that most pilots rarely pay close attention to. It is the engine tachometer. Its only purpose in life is to read the engine RPM. An interesting thing about this instrument in your basic GA airplane is there is no direct mechanical connection between the tach needle and the engine. The needle moves because the tack cable spins a metal drum inside the tack head setting up a magnetic field which turns the needle. We found that most old tachs read lower than the actual RPM of the engine! This low tach reading can cause some serious problems! For example, on GA airplanes with fixed pitched propellers, engine power settings are set according to tach readings. If the tach is reading lower RPM than actual engine RPM, more fuel is being used. Now couple that piece of information, with a long cross country, with higher then forecast headwinds, and with fuel gauges that are only accurate when empty, it is then not hard to see why so many pilots run out of fuel on final.

Something to keep in mind is the fact mechanics use the tach reading when setting the propeller governor for constant speed propellers. If the tach is used as a reference and the tach read low, then the governor setting would allow a higher RPM than specified when either the propeller or governor is replaced. The higher RPM will allow the engine to over-speed on take-off which would contribute to excessive vibration and premature wear to the engine.

One of the things you should check before flight is the magneto switch for a hot mag, so make sure during run up that the engine can be shut down with the magneto switch.

Another item pilots tend to forget, except on really cold days, is the primer. The hand operated primer on most small GA aircraft rarely cause problems. However, if the engine runs badly and lopes at idle but the mag check at 1700 RPM is great, chances are, even if the primer is locked, one or more of the "O" rings on the primer piston is leaking and allowing fuel to be sucked into the engine on the intake stroke. This extra fuel enriches the intake fuel/air ratio which makes for a rough idle and little or no mag drop when you check the magnetos. Another indication of a very rich mixture is a black sooty exhaust in the pipe and on the fuselage aft of the exhaust pipe.

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Part 2 is on exterior inspection of the airplane and the flight test.

Bill O'Brien is a National Resource Specialist in Flight Standards' Continuous Airworthiness Maintenance Division.

MID-AIR: A Word That Can Strike Terror In The Hearts Of Pilots

by H. Dean Chamberlain

Recently, there have been a series of mid-air collisions around the country. Fortunately, not every mid-air results in serious injury or death. The collision of a Cessna and Piper aircraft at the Plant City, Florida, airport was one such non-fatal accident that made national headlines because of its uniqueness. A classic high-wing, low-wing collision, the two aircraft became stuck together and remained together throughout the landing roll out. This non-fatal accident was the exception of the recent spate of mishaps: Many involved multiple fatalities.

FAA thinks the number of recent mid-air accidents is reason for alarm. Whether there is a trend developing because of the increased flight activity that is occurring in the United States, or the recent increase in accidents is just a series of unfortunate coincidences, or a combination of both, only time will tell. But regardless of the outcome, it is important for the safety of all that pilots and their passengers, for student pilots and their certificated flight instructors, and for everyone who flies to work hard to avoid what may be one of the scariest types of aviation accidents: a mid-air collision.

INFORMATION AND THE INTERNET'S SAFETY ROLE

There is an old expression that says knowledge is power. In today's electronic world, knowledge is readily available for those who want it. With that knowledge comes the power to protect oneself. One of the benefits of the Internet for those who are connected to it is that many of the aviation and aviation related news sites have extensive information on the recent accidents, including photographs and in some cases interviews with the people involved. The Plant City mid-air is one of those accidents.

For those not familiar with the accident, it involved a high-wing aircraft and a low-wing aircraft approaching to land. If you did not see news accounts of the accident, apparently each aircraft was operating in the classic blind spot of the other aircraft. The low-wing aircraft apparently landed on top of the high-wing aircraft while both were on final approach to land.

A word of caution is necessary though about Internet accident stories or data, or even National Transportation Safety Board (NTSB) preliminary accident data. In many cases, the accidents are still being investigated. Until the NTSB issues its final report on the incident or accident listing its finding of a probable cause or causes, everything published about the incident or accident before NTSB releases it official report is speculative and subject to change.

FAA Aviation News makes no claims as to probable cause of any incident or accident mentioned in this article. The incidents or accidents mentioned are based upon public news media information only. As noted, the NTSB is responsible for determining the cause of any incident or accident.

HIGH WING VS LOW WING TYPE OF ACCIDENTS

In this type of accident, the low-wing aircraft's wings and fuselage can block the pilot's ability to look downward and forward at certain angles. The result is the low-wing aircraft's design masks another aircraft flying below it.

Apparently, the low-wing pilot did not see the high-wing aircraft on final. Of course, the Cessna's high-wing design and cabin structure makes it hard for its pilot to see another aircraft descending from above and behind. Fill these two blind spots with another aircraft and there is a good chance that a mid-air may result.

Fortunately in this case, both aircraft, although stuck together as a result of the collision, were able to land as one through the piloting skills of the flight instructor in the high-wing aircraft on the bottom of the stack. Pictures of the joined aircraft are available online as well as interviews with those aboard the aircraft at <www.avweb.com/articles/profiles/cessper>.

Other pilots were not so fortunate.

Although the pilots in the Plant City accident survived, some of the other pilots and passengers did not.

As we approach the middle of summer and one of the busiest flying periods of the year, we thought it a good idea to discuss some of the ways pilots and their passengers or students can minimize their risk of having a mid-air.

PASSENGERS

If you are wondering why we included passengers, we think it is important that passengers, particularly those who fly frequently in general aviation aircraft, be instructed how to help scan the airspace they can see, and what they should do if they see another nearby aircraft.

This is important for all flights in visual meteorological conditions, and it is especially true if the flight is on an instrument flight plan in such conditions. The reason is some pilots on an instrument flight plan may become, shall we say, complacent, for lack of a better word, under such conditions when they think air traffic is radar monitoring their flight and surrounding airspace and providing timely traffic information. The issue is air traffic provides IFR services only in controlled airspace based upon known traffic. In visual conditions there may be other aircraft operating in the area that air traffic may not know about.

As just discussed, passengers play an active role in mid-air prevention. Not only do they provide another pair of eyes to scan for traffic, they often sit in areas that give them a wider zone of airspace to scan. Since they are not normally involved in flying the aircraft with all that that demands of a pilot's time and concentration, passengers can usually spend more undivided time scanning for other traffic.

UFO's

No, we are not talking about Star Wars™ and Star Trek™ or Mulder and Scully investigating an X-File™ . We are talking about something more earthbound and explainable. The root of the problem is when an air traffic controller (ATC) may be only using computer-generated video rather than actual radar skin paint to track aircraft. At such times, the "radar" system may be operating on transponder-generated data rather than on actual radar transmissions. If an aircraft does not have an operating transponder onboard or if its transponder is turned off or is not functioning, then ATC may not be able to see the target. This is why all pilots have to be alert for all aircraft and objects that may be in their immediate vicinity.

These "unidentified flying objects" or UFO's may include aircraft without transponders or radios; sailplanes or gliders, many of which don't have a radio or transponder onboard; or the UFO may be one of the newer, composite aircraft or sailplanes; or it could be parachutists; or one of the other types of flying objects such as a FAR Part 103 ultralight vehicle or a flock of birds in your flight path.

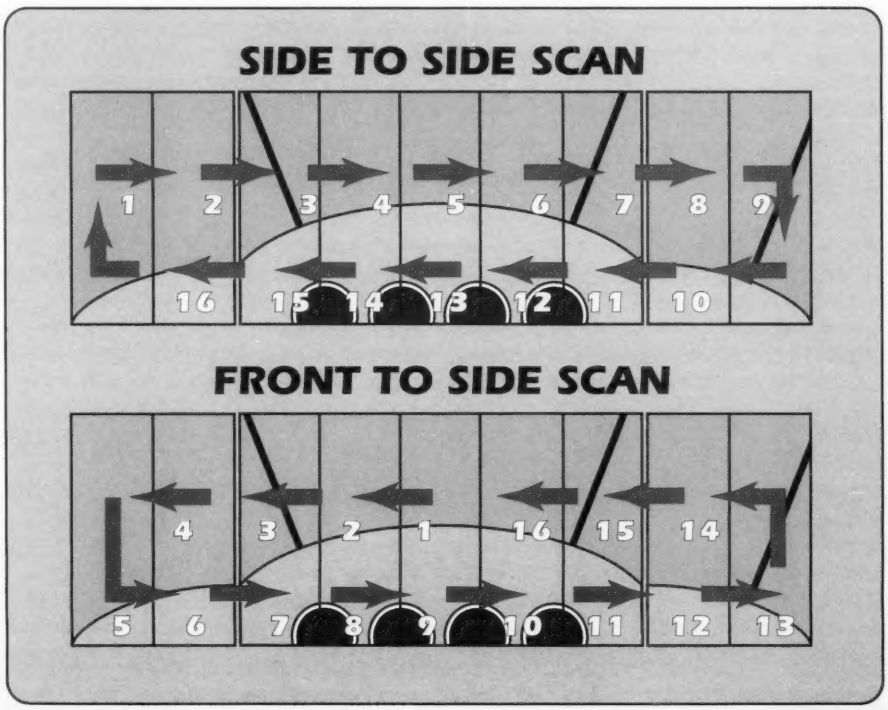
Many of these may or may not be detected by ATC. But all of them can ruin a pilot's whole day in the event of an unexpected meeting. So it is important to keep both yourself and your passengers in the safety loop. Just remember not every aircraft has to be transponder-equipped and not every flying object shows up on radar. Birds and composite gliders were stealth long before stealth became fashionable.

As the air traffic system goes to a more digital, computer-based flight control system such as the developing automatic dependence surveillance, broadcast (ADS-B) concept being developed where aircraft will continuously broadcast their position using onboard GPS derived positioning data to each other and air traffic control (ATC), and away from the more tradition radar system, this problem will continue to grow. ADS-B, like many aviation systems, when it works, will be great, but the question remains as to how low an altitude can ADS-B and other such equipped aircraft go and still work amid the UFO's? Then the question will be, can any aircraft take off without such a system or with a malfunctioning ADS-B and still operate in the system?

Regardless of the outcome of these questions, the basic concept of see and avoid will always apply.

SEE AND AVOID

One of the pillars of aviation safety is the see and avoid regulation (FAR §91.113(b)). When weather conditions permit, this rule requires all pilots to see and avoid other aircraft. To aid pilots in being able to see and avoid other aircraft, the Federal Aviation Regulations spell out in great detail procedures designed to help keep aircraft apart. The aircraft speed limitations, flight visibility requirements, right



of way rules, navigation and aircraft lighting requirements, and others are all designed to help make it possible for a pilot to see and avoid other aircraft in a timely manner. When the visibility is reduced, there is a whole set of regulations for operating in instrument meteorological conditions. But since many mid-air collisions occur in daytime, visual meteorological conditions and in many cases, severe clear conditions, this may be the time to remind all pilots of the need to keep a sharp vigil while flying and especially in certain high risk environments. Statistics show the most dangerous area is within 10 miles of an airport and below 3,000 feet above the ground within that zone.

PROPER SCANNING

I think it is a fair statement to say that the human eye was not designed to locate another small aircraft in flight. Birds of prey we are not. Although researchers have written many books on the subject, there are a few simple tips that pilots and passengers can use to help themselves better "see" other aircraft in flight. One of the problems in "seeing" other aircraft is the eye has a hard time focusing in an "empty space" such as the sky surrounding a small aircraft in flight. This results in the possibility the eye may not see a small aircraft approaching on a collision course unless the pilot works at seeing the approaching aircraft.

AIRCRAFT SPEED AND CLOSURE RATES

Another mid-air risk involves aircraft speed. For example several years ago in a *FAA Aviation News* reprint titled "Gray Matters," We wrote about the dangers of mid-air collisions and near mid-air collisions involving military aircraft flying along designated military training routes (MTR). The article focused (pun intended) on how proper scanning and following recommended flight planning can help reduce that risk. Adding to that risk factor is the fact that many military aircraft flying the routes are relatively small attack or fighter aircraft that, not unlike their smaller general aviation aircraft cousins, are much harder to see, but the military aircraft also pose the risk of a very fast closure rate between the military aircraft and any potential conflicting aircraft. This fast closure rate makes it very important for pilots flying near these routes to develop good techniques for "seeing" other aircraft quickly and taking prompt evasive action. The "Gray Matters" reprint also discussed in detail how to learn to see more effectively. The reprint reminded pilots that the best way to see fast moving military aircraft on an MTR, is to check with the nearest Flight Service Station to see if the route is being used and if so, during what times.

Some of the recommendations in the reprint included how pilots and passengers can improve their scanning techniques by only scanning a narrow segment of space at a time and how to focus the eyes both near and far within that narrow segment. This technique helps the eye to better "see" an object within that sector. Known as the

Even though you're "only" going 110 knots, you add your speed to the other aircraft's for your closure rate—rarely enough time to react.

"block" technique, the idea is to scan a narrow 10 to 15 degree sector near and far looking for a moving or contrasting object. Each narrow sector should only be scanned for a brief period of time to avoid vision fixation. This technique should be used to scan about 60 degrees left and right of the aircraft and 10 degrees above and below the aircraft's flight path. Whether someone scans the whole 60 degree arc in one direction or splits the arc into two segments and scans each segment individually, doesn't matter. The key idea is to have some method to increase the potential to detect an approaching aircraft.

PREFLIGHT INFORMATION

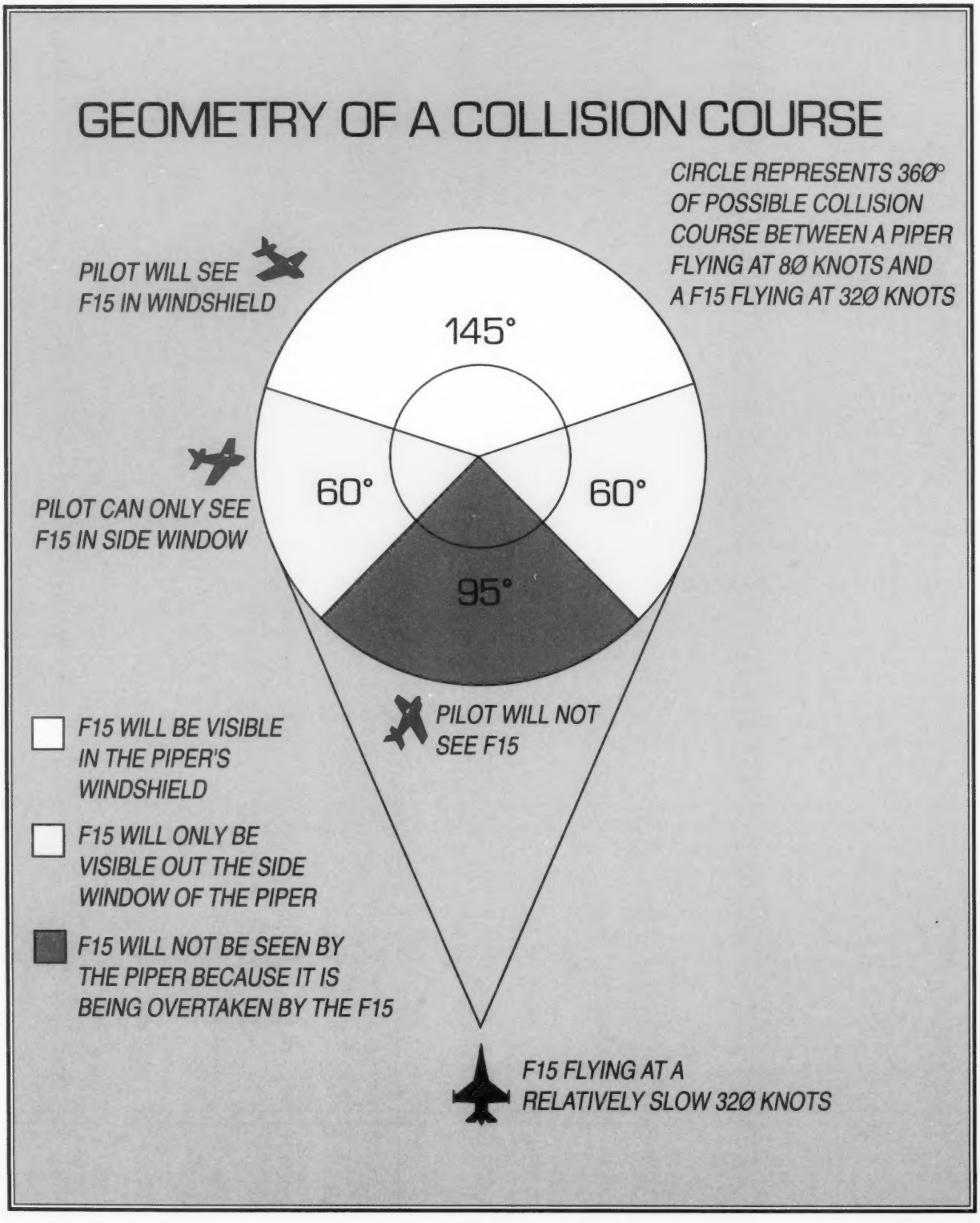
It is now possible to find important safety information and ways to avoid a possible mid-air collision with high speed military aircraft by searching the Internet for select Department of Defense (DOD) military installation data. For example, Tyndall Air Force Base in Florida has a website that talks about local flying procedures and ways to minimize the risk of a mid-air collision with a fast moving military aircraft. As the site points out, "A bit of caution is required when flying in Northwest Florida. You are sharing the airspace with three major USAF bases (Hurlburt, Eglin, and Tyndall Air Force Bases) and the Pensacola Naval Flying Training Center. All the military installations in the Florida Panhandle are conducting some form of flight training...."

The site goes on to say that, "The potential for a mid-air collision in the Panama City/Tyndall area is high."

Part of that reason is the reported number of banner-tow, fish spotter, and sight-seeing civil aircraft operating along the Gulf Coast area along with the mix of high performance military aircraft.

Pilots planning on flying in or through such areas should check current FAA charts for accurate navigational data and radio frequencies, any designated special use air

GEOMETRY OF A COLLISION COURSE


CIRCLE REPRESENTS 360° OF POSSIBLE COLLISION COURSE BETWEEN A PIPER FLYING AT 80 KNOTS AND A F15 FLYING AT 320 KNOTS
PILOT WILL SEE F15 IN WINDSHIELD
145°
60°
60°
PILOT CAN ONLY SEE F15 IN SIDE WINDOW
95°
PILOT WILL NOT SEE F15
F15 WILL BE VISIBLE IN THE PIPER'S WINDSHIELD
F15 WILL ONLY BE VISIBLE OUT THE SIDE WINDOW OF THE PIPER
F15 WILL NOT BE SEEN BY THE PIPER BECAUSE IT IS BEING OVERTAKEN BY THE F15
F15 FLYING AT A RELATIVELY SLOW 320 KNOTS

space, and any published known hazards. In addition, pilots should check with their local Flight Service Station (FSS) for any current Notices to Airmen (NOTAMS) and if any military training routes are active. The pilot can also check the Internet to see if there is any published information concerning the military installation.

Tyndall and other bases were found doing a generic word search for the word "mid-air." The word also provided detailed information on other sites as well.

STERILE COCKPIT

A concept being discussed within the FAA's General Aviation and Commercial Division (our parent organization) is the idea of a voluntary sterile cockpit (VSC) for general aviation. Similar in concept to that of the mandatory rule in air carrier aircraft that permits only essential communications within an air carrier cockpit below 10,000 feet, the idea is to reduce, if not eliminate, non-essential communications within a GA cockpit/aircraft while within a terminal airport area. Details such as what is the terminal area environment, what altitude, and other such details are being discussed. The rationale behind the VSC idea is that by reducing or eliminating all non-essential distractions to a pilot within a terminal area, both on the ground and in the air, the pilot is less apt to become a runway incursion or mid-air statistic.

Although a passenger can provide valuable information about a possible mid-air or other aircraft problem, that same passenger can also become a distraction to a pilot in situations requiring a high level of pilot concentration. The challenge for the pilot in command is to develop the best balance between the need for critical information and the need to eliminate distracting chatter from any passenger. The airline industry has it easy—its pilots just shut the cockpit door and don't make idle chatter while below 10,000 feet. Then the air carrier pilots just have to remember to only discuss flight related information. For some reason, I don't think that idea will work in your typical family four-place skyrider with the spouse and kids demanding attention just about the time the aircraft rotates—plus how many GA aircraft have a cockpit door? As we said—the details are pending. But the concept has the potential to reduce distraction caused incidents and accidents in the GA community. A collision on a runway, taxiway, or in the sky can be just as deadly to those involved in a GA aircraft as it is in an air carrier aircraft.

USING AIR TRAFFIC CONTROL

Air traffic control (ATC) can provide another set of "eyes" looking out for the safety of a flight. Although ATC's primary jobs are providing for the safe operation of aircraft on instrument flight plans and moving aircraft in and out of towered airports, ATC can and does provide such services as radar flight following for aircraft operating under visual flight rules on a time permitting basis. However, pilots should be aware that, except when operating in Class B and C airspace areas, ATC will provide traffic advisories, but is not responsible for the separation of VFR aircraft. The key to remember about ATC is that it may not be able to "see" all the traffic in an area. Its services are based upon known information. There may be circumstances where ATC may not be aware of another aircraft. Only when it is too bad for birds and VFR pilots to fly can one expect that the sky in controlled airspace may be in fact totally under ATC control. Then you hope that some "fool" is not up trying to scud run in controlled airspace. That is why it is important to follow the rules. When the weather is below visual meteorological conditions (VMC), pilots should either sit on the ground and wait for better conditions or, if instrument rated, current, and in an instrument qualified aircraft, request an instrument clearance and follow it once issued by ATC. No one wants illegal, scud running aircraft flying around, especially near airports, because no pilot following the rules wants a mid-air with someone ignoring the rules or anyone else for that matter!

HEAD OUT OF THE COCKPIT

No, we are not talking about flying in an open cockpit aircraft. We are reminding pilots with complex communications and navigation equipment (read, GPS systems) of the need to keep looking out the windshield. In talking to a few pilots, some say that it takes a lot of time to program or make changes in their GPS devices. In some cases, they were trying to learn how to operate their equipment. The problem is pilots are not looking out for other traffic as much as they should. Nor are two-person crewed aircraft such as air carrier flight crews immune to the "head down in the cockpit" syndrome. In reading some of the FAA-sponsored, NASA-administered Aviation Safety Reporting System (ASRS) reports involving crew errors, more than one has said one or more of the crewmembers were busy doing something else such as inputting data in their flight management system or doing some other chore rather than flying the aircraft.

FOLLOWING RECOMMENDED OPERATING PROCEDURES

Another area where pilots can reduce their risk of a mid-air collision is by using recommended operating procedures when operating in an airport terminal area whether that airport is towered or non-towered. Although arguably the best way to avoid having a mid-air experience is to only fly in areas where other aircraft don't fly; that is not always possible or practical. The problem is at some point all aircraft must eventually land. Most of those landings occur at designated airports with the result that at times more than one aircraft may be trying to land at the same airport at the same time. In the case of the Plant City accident, both aircraft did try to land at the same time on the same runway. The resulting photographs were graphic proof that two ob-

Not a new type design but an accident where luck and skill allowed all occupants to survive every pilot's worst nightmare.

jects can't occupy the same space at the same time and do it safely. So what can be done. Glad you asked. The following are some ideas that can help reduce the mid-air risk in the terminal environment:

1. Follow recommended FAA radio procedures as outlined in the *Aeronautical Information Manual* (AIM) and advisory circulars. At non-towered airports, pilots should self-announce their intentions and location. Accurate position reports are critical for everyone's safety. As more and more pilots fly with GPS onboard, at some point, there will be no reason for pilots of radio-equipped aircraft not to accurately report their position. We don't know if it is important that every report include the position to the nearest 1/10 of a mile as some pilots are now reporting, but even that is an improvement over aircraft giving a false, misleading, or no report. Reporting inbound at 10 miles out gives everyone the knowledge that there is another aircraft joining the traffic pattern environment. Then accurate reports in the traffic pattern provides the final safety report everyone needs before taking off or landing. Pilots just need to remember that giving one's position in lat-long coordinates has little meaning to those who don't know the coordinates. The use of well-known landmarks or compass directions can provide better information.

2. Just as important as using recommended operating procedures so that everyone can predict what the other pilot might do, two-way radio communications provide an important safety function. Simply stated, radios can save lives. Even if you are the only pilot in the pattern, by self-announcing your intentions, you are providing valuable information to aircraft on the ground and in the air near the airport that there is another aircraft nearby. However, the reverse is not true. The lack of communication does not mean that another aircraft is not nearby. Some aircraft don't have a radio onboard or the aircraft could have had a radio failure or the pilot could be transmitting and listening on the wrong frequency. All have happened and will continue to happen.

3. Lights on for safety is another important way to reduce the risk of a collision. See and avoid is the cornerstone of flight in visual conditions both for flights conducted under visual flight rules and for flights conducted under instrument flight rules while operating in visual conditions. One way to enhance an aircraft's visibility is by flying it with its lights on while operating in the terminal areas whether required by regulations or not.

As we reported several years ago in an article about an air carrier aircraft that landed on top of a smaller aircraft holding at night waiting to takeoff at Los Angles International Airport, it is important that all pilots remember to make their aircraft as visible as possible while on the ground or while in the air consistent with good operating procedures. There is a corresponding rule that says if you are landing on a runway or descending to land that you have a responsibility to make sure that you are not landing on top of someone whether that someone is in another aircraft or in a Mark-1 cement truck parked on the runway.

4. Situational awareness (SA) is also important for several reasons. Although we normally think of situational awareness to mean a pilot's awareness of his or her surroundings and location normally in relationship to an instrument approach procedure or hazardous terrain, SA may also mean other types of situational awareness. For example, as the FAA Safety Program Manager of the Orlando

Flight Standards District Office (FSDO) has said, the Orlando FSDO's area has a lot of flight training going on because of both its location in sunny Florida and the number of flight schools and university flight programs within its area of responsibility. For example, Embry-Riddle Aeronautical University's main campus is located at Dayton Beach and Florida Institute of Technology's flight program is based at Melbourne.

And one of the concerns about the number of flight training schools in the Orlando area is that many of them teach foreign students. Although English is the official language of aviation, not every foreign student may have as broad an understanding of English as a native English speaking American. To reduce any potential language problems, all pilots and controllers should remember to use the terms, expressions, and procedures outlined in the *Aeronautical Information Manual*'s (AIM) communications section.

When one adds in all of the other types of flight schools, parachute drop zones, the constantly expanding air cargo and passenger operations, and military operations in and out of the area, it becomes easy to understand why the Orlando FSDO is very concerned about flight safety and is actively searching for ways to reduce the risk of even more mid-air accidents. This article is one of those ways.

One of the keys to solving the problem is for anyone operating within a high operational flight area, such as the Orlando FSDO area, to be especially alert to the increased risk of a mid-air in such a high tempo environment. The same is true in other parts of the country. Gone are the days in many parts of the country when it was hard to find or see another aircraft within miles. Add in the increase of new pilot training and the increase in overall flight activity due to the booming economy and the sky is starting to fill up around high density metropolitan areas.

Does this mean that if you are flying along at a deserted landing strip you can relax and not pay attention? The answer is definitely no. You must remember it only takes one other aircraft to ruin your whole day.

5. Accidents can happen at both towered and non-towered airports. Just because you are operating out of a towered airport with controllers on duty does not guarantee your safety. There was one recent accident involving two aircraft at a towered airfield.

History has recorded many instances were someone has landed or taken off on the wrong runway or on the right runway with another cleared aircraft on the runway or about to land. Add in the problem of runway incursion in which someone may have made an operational mistake taxiing, taking off, landing, or controlling the airspace or ground environment, or someone on the ground violated the operating environment, and it becomes clear that pilots must constantly be on the lookout for danger and other aircraft from the moment their own aircraft first starts to taxi until that aircraft is secured in its chocks and securely tied down after a flight.

6. One important visual cue of possible mid-air collision is when two aircraft at the same altitude maintain a constant relative bearing (CRB) to each other. What this means is that when two aircraft at the same altitude maintain a CRB to each other they will eventually collide. No, we are not talking about two aircraft in trail. But when a pilot sees another aircraft that is not directly ahead of the pilot's own aircraft, the first thing the pilot should check for is a CRB between the two aircraft. The way to check for a CRB is for the pilot to maintain a constant heading and if the other aircraft remains in the same spot in the windshield, there is a very high chance that the two aircraft will collide unless some action is taken by one or both aircraft.

Another problem with an aircraft at a constant relative bearing is that the CRB makes it more difficult to see the other aircraft because as pointed out earlier, the human eye detects a moving object better than a stationary object. An aircraft at a CRB remains stationary until impact or one of the aircraft takes evasive action.

7. Another danger area is when an aircraft is making an instrument approach at an non-towered airport or a practice instrument approach at such an airport in marginal visual meteorological conditions. There is always a risk that VFR aircraft may be operating in the traffic pattern if conditions permit. In some cases, the instrument procedure may cause a potential head on collision with traffic in the pattern depending upon the wind, landing runway, and to which end of a runway the instrument approach is designed to serve. The proper use of radio communications procedures outlined in the AIM and in advisory circulars will help reduce the risk of a possible mid-air.

8. Finally, two remaining mid-air collision risks are failure to make clearing turns and being blinded by the sun and/or haze. As discussed, certain types of aircraft have built in blind spots because of their design. Because of these blind spots, pilots can avoid running into another aircraft flying in one of these blind spots by making small clearing turns periodically while climbing, descending, or while flying straight and level. The final obstacle to good see and avoid techniques is the sun. Whether it is a sunrise or a sunset, a low angle sun position combined with some smoke, haze, or fog, it can almost blind a pilot to seeing anything directly into the sun. In such conditions, pilots need to be especially careful. Wearing sunglasses and using see-through sun shades in the aircraft help.

The purpose of this article is to provide pilots with some ideas and ways to avoid the risk of a mid-air collision. *FAA Aviation News* would like to hear from its readers about their ideas and thoughts on the subject. We will review any submitted comments and combine the best of them into another article on the subject for the beginning of the flight season next spring.

Dehydration and the Pilot

by Rogers V. Shaw, II

With the return of spring and its warming temperatures and better flying weather, it's time to educate general aviation pilots about proper fluid intake for body hydration. The educational process should start now, before the heat of summer causes pilots to become dehydrated and at increased risk for incidents and accidents.

We live in different climatic regions and are all physiologically different, so all we can do is describe the standards for average conditions. Adjustments must be made depending on the circumstances.

A few hot weather causes of dehydration are hot cockpits and flight lines, wind, humidity, and diuretic drinks—coffee, tea, alcohol, and soft drinks—changes in climatic conditions, sunburn, and improper attire for conditions.

Preventing Dehydration

To help prevent dehydration, you should drink two to four quarts of water every 24 hours. Since each person is physiologically different, this is only a guide. Most people are aware of the eight-glasses-a-day guide: If each glass of water is eight ounces, then you end up with 64 ounces, which is two quarts.

The key is that you should be continually aware of your condition. Most folks will become thirsty with a 1.5-quart deficit, or a loss of 2% of total body weight. This level of dehydration triggers the "thirst mechanism." The problem, though, is that the thirst mechanism arrives too late and is turned off too easily. A small amount of fluid in the mouth will turn this mechanism off, and the replacement of needed body fluid is delayed. Remember, the amount of water you drink will depend on work level, temperature, humidity, personal lifestyle, and individual physiology.

If you do not stay aware of the environmental conditions and your personal physiological status, you can progress to heat exhaustion, even if you are maintaining the above re-hydration water intake. This is because under certain conditions external fluid intake cannot keep up with the loss of fluid by the body. There are three stages of heat exhaustion. Some common signs of dehydration are headache, fatigue, cramps, sleepiness, and dizziness. Transition from the one stage to the other can be very evident, hardly noticeable, or not evident at all.

Fly safely and never pass up an opportunity to have a fresh glass of water.

Rogers Shaw is the team coordinator of the CAMI Aeromedical Education Division's Airman Education Program.

This article originally appeared in the Spring 2000 issue of The Federal Air Surgeon's Medical Bulletin.

Three Stages Of Heat Exhaustion

Transition from the one to the other can be very evident, hardly noticeable, or not evident at all.

Heat stress (body temperature, 99.5-100°F) reduces

- Performance, dexterity, and coordination
- Ability to make quick decisions
- Alertness
- Visual capabilities
- Caution and caring

Heat exhaustion (101-105°F) symptoms:

- Fatigue
- Nausea/vomiting
- Giddiness
- Cramps
- Rapid breathing
- Fainting

Heat stroke (>105°F) symptoms

- Body's heat control mechanism stops working
- Mental confusion
- Disorientation
- Bizarre behavior
- Coma

How to Be Aware of and Prevent Heat Exhaustion

1. Drink cool (40°F) water (forget the old "sports day" theory that lukewarm water is absorbed faster into the system).

2. Carry a container so you can measure daily water intake.

3. Don't rely on the thirst sensation as an alarm...stay ahead. If plain water is offensive, add some sport drink flavoring to make it more acceptable.

4. Limit your daily intake of caffeine and alcohol (both are diuretics and stimulate increased production of urine).

5. Exercise can cause a large amount of body fluid loss that is difficult to replace quickly.

6. Acclimation to a major change in weather takes one to two weeks.

7. Monitor personal effects of aging, recent illness, fever, diarrhea, or vomiting.

8. Monitor your work and recreational activity; if you feel light-headed or dizzy, call it a day.

9. In extreme heat and exercise conditions, salt and electrolyte loss is a factor but not for the average person with a moderate exercise program. The American diet takes care of the loss.

CALENDAR OF EVENTS

July 22-23 - UNITED STATES AIR AND TRADE SHOW, Dayton, OH

For more information you can call (937)898-5901or check its website at http:/www.usat.org

September 2-4 - CLEVELAND NATIONAL AIR SHOW, Burke Lakefront Airport, OH

The U.S. Air Force Thunderbirds is scheduled to perform.

For more information you can call (216)781-0747 or check its website at www.clevelandairshow.com

September 14-17 - NATIONAL CHAMPIONSHIP AIR RACES®, Reno, NV.

The 37th annual "Reno" Air Races will be held and this year's theme will be "Racing with Legends." They will all be hosting the U.S. Naval Demonstration Team, the Blue Angels. For more information, call (775) 972-6663 or visit their website at <www.airrace.org>..

September 30-October 1 - SPRINGFIELD AIR RENDEZVOUS, Springfield, IL

The 18th annual air show at the Capital Airport will feature the USAF Thunderbird Demonstration Team. For more information, contact (217) 789-4400 or visit their website at <www.springfield-il.com/airshow>.

November 15-16 - AIRPORT CONFERENCE, Rosemont, IL

FAA's Great Lakes Airports Division will hold its sixteenth annual airport conference at the Holiday Inn O'Hare International. This year's conference will include presentations by over 50 speakers, covering topics on airport management, capacity, construction, design, environmental issues, FAR Part 139, NAVAIDS, and safety issues. For registration and general conference information, please contact Michelle at (847) 294-8314.

B-17 TOUR AND UPCOMING AIR SHOWS

The EAA B-17 is scheduled to be at the following locations during July. The expected flight times for the B-17 are 8 am; 8:45 am; 9:30 am; 10:15 am; and 11 am. During EAA AirVenture 2000 at Oshkosh, WI, a 11:45 flight has been added to the times. Please note all tour stops, times, and locations are subject to change without notice.

City	*Airport Code*	*Dates*
Topeka, KS	AAO	July 3-6
Peoria, IL	PIA	July 7-10
Decatur, IL	DEC	July 11-13
West Bend, WI	ETB	July 14-16
Racine, WI	RAC	July 21-23
Oshkosh, WI	OSH	July 25-Aug 1

RUNWAY INCURSION CORNER

Taxi Into Position And Hold

Four simple words that can make or break your day. In the November/December 1992 issue of this magazine, we reviewed the National Transportation Safety Board (NTSB) accident report of the collision of two aircraft on a runway at Los Angeles International Airport. The accident occurred on February 1, 1991, when Skywest Flight 5569, a Fairchild *Metroliner*, had been cleared to taxi into position and hold on Runway 24L at Intersection 45. The other aircraft, USAir Flight 1493, a Boeing 737-300, had been cleared to land on 24L. Thirty-four passengers and crew were killed in the resulting collision.

The NTSB report listed several factors in the accident. One was the fact the local controller had cleared both aircraft onto the same runway. The report noted that both controllers and pilots can make a mistake. The report also said pilots need to be alert and vigilant in monitoring air traffic communications for situations that may lead to conflicts with other aircraft.

The NTSB report went on to highlight such factors as proper communications, the danger of complacency while operating in a radar environment, the need to see and be seen, the need for pilots and controllers to follow established procedures to ensure everyone knows and can anticipate each others' reactions, and the importance of situational awareness for both flight crews and controllers.

The article addressed the issue of situational awareness by discussing the role of stop, look, and listen when operating an aircraft. Basically, the rule says pilots should stop, look, and listen before putting themselves at risk. This concept applies on the ground as well as in the air.

By ensuring their next block of airspace, taxi space, or runway space is free of any potential dangers, pilots can minimize their risk of a collision whether in flight or on the ground.

A key element in this concept is the historic "See and Avoid" principle that all pilots are taught from their first training flight. This means pilots must maintain a watch outside their respective cockpits to see and avoid other aircraft. At times, this can be a challenge for pilots flying an unfamiliar aircraft or one with a complex communications or navigation system onboard. An example of this complexity is someone trying to learn how to operate a new GPS receiver while taxiing or in flight. Even if you know how to properly operate your GPS or flight management system, pilots can spend a lot of heads down time in the cockpit reprogramming the system after an air traffic routing change.

Several NTSB recommendations resulted from this 1991 accident:

- Pilots should remain alert at all times when operating their aircraft, especially when on the runway or when landing.
- Pilots should do all they can to increase the conspicuity of their aircraft either through improved lighting equipment or through such NTSB recommended techniques as offsetting from a runway's centerline lighting when operating in reduced visibility, e.g., during periods of darkness or other periods of reduced visibility.
- Pilots should monitor all ATC communications that could affect their aircraft, and we will add, not just ATC communications but also UNICOM or CTAF transmissions at non-towered airports.

Several years later, in the October 1995 issue of the *FAA Aviation News*, the magazine published an article from the FAA's Air Traffic Terminal Procedures Branch discussing the agency's rules and procedures for controllers when a controller clears an aircraft into position and hold (TIPH). Controllers were reminded not to TIPH an aircraft for an extended period of time, when no operational advantage is gained, and when the position is not visible from the tower. The article went into more detail than this summation, but the article did discuss the need for controllers to be alert and to avoid non-operational conversations. This reminder emphasized that like a pilot taxiing onto a wrong taxiway or runway by mistake, controllers can also make a mistake by taxiing an aircraft into position and hold and forgetting about the aircraft when the controller becomes distracted by other traffic or non-essential distractions.

The reason we bring this point up is because each pilot who accepts a TIPH clearance has to accept the responsibility for his or her own safety. Whether that means monitoring for traffic or reminding the controller you are holding on the runway, each pilot holding on a runway must maintain a level of situational awareness that will protect the bubble of airspace that pilot's aircraft occupies.

That includes the airspace behind the bubble to protect against any approaching aircraft that might land on top of the bubble as well as any approaching aircraft taxiing towards the bubble or on any runway or taxi way that will intersect your runway.

Because the risk of runway incursion can come from any direction, pilots must always be alert to other aircraft, vehicles, or pedestrians. Don't become a statistic because of someone else's mistake. Protect your bubble at all times.

EAA AirVenture Oshkosh 2000

by H. Dean Chamberlain

The special FAA Air Traffic Management Plan *Notice to Airmen* (NOTAM) for the 48th annual Experimental Aircraft Association's (EAA) Fly-In Convention at Wittman Regional Airport, Oshkosh, WI, is available. The NOTAM provides detailed arrival and departure procedures for aircraft and ultralight vehicles flying to, through, and from the Oshkosh area from **July 23 to August 1**. *Note the special NOTAM procedures start July 23, three days before EAA AirVenture Oshkosh 2000 officially opens.* The EAA AirVenture Oshkosh 2000 dates are July 26 to August 1. As noted in the NOTAM, "Pilots should expect last minute changes to previously issued or anticipated procedures and/or clearances."

Like our past *FAA Aviation News* notices on the fly-in, this article does not provide detailed operating procedures for flying to AirVenture Oshkosh 2000. Rather, it provides a brief overview of some of the important safety information and flight services provided in the NOTAM and the special reference booklet prepared for the event. Pilots planning on flying to AirVenture Oshkosh 2000 should obtain copies of the below referenced products to help them plan for a safe flight to and from Wittman Regional Airport and nearby airports by noting the procedures, both old and new, outlined in the NOTAM. The first page of the NOTAM highlights the many changes for 2000. Like all flights, no flight is complete until the pilot and passengers are all home safely. Getting to Wisconsin is only half of the trip. The pilot in command's ultimate responsibility is getting safely home after a great visit to AirVenture Oshkosh 2000.

NEW TIPS

All pilots should review their respective holding procedures in case holding is required.

Warbird pilots should review their special operating procedures for changes from last year's published procedures. Page 7 of the NOTAM details the new warbird operating procedures and changes for 2000. For example, one of the new warbird changes for 2000 is the requirement that "Slower warbirds unable to maintain 150 MPH, must use the VFR arrival procedure from over RIPON. PLEASE NOTE THE SLOWER WARBIRD REFERENCE TO FISK ON PAGE 7 OF THE PRINTED NOTAM IS INCORRECT. The arrival procedure starts at RIPON. All other Warbirds shall use the warbird arrival procedures stated above." Also, in the past most warbirds were assigned Runway 27. This year the warbirds are to primarily use Runway 36. To read all of the new information, Warbird pilots should review page 7 of the NOTAM for complete details. The Internet Website version has been corrected.

Other NOTAM 2000 changes include new published Wittman Regional Airport (Oshkosh) and Fond Du Lac airport operating hours, and new ultralight runway information at Wittman Regional.

OSHKOSH FLY-IN QUICK REFERENCE BOOKLET

The FAA Office of System Safety has produced a Fly-In Quick Reference Booklet highlighting the procedures outlined in the NOTAM. For a copy of the Fly-In Quick Reference Booklet, pilots can call (800) 564-6322 or check the following website at http://www.asy.faa.gov (look under

THE PAPER AND INK USED IN THE ORIGINAL PUBLICATION MAY AFFECT THE QUALITY OF THE MICROFORM EDITION.

publications). Also, a pictorial presentation of the key reporting points and landmarks is available on this website. This gives pilots a particularly helpful look at the landmarks and key reporting points used in the special flight procedures.

EAA AirVenture Oshkosh 2000 information will also be published in the Special Airshow Section of the FAA *Notices to Airmen* publication. The NOTAM is also on the FAA's Website at www.faa.gov/NTAP. Even if you have flown to Oshkosh in the past, you will still need to review the NOTAM for changes. The NOTAM has special sections for both IFR and VFR pilots. If this is your first flight to Oshkosh, you need to get a copy of the NOTAM and study it in detail. If you are a first time flight arrival, finding yourself number 10 in trail to enter the traffic pattern is not the time to wonder what is going to happen next.

Although the arrival and departure procedures are not complicated, they do need to be understood very well. The procedures are designed to move hundreds of aircraft safely, quickly, and predictably in and out of the Oshkosh area and Wittman Regional Airport by having both pilots and controllers follow the same published procedures. Knowing and following the published procedures are especially important in the case of an emergency at Wittman Regional Airport or one of the nearby airports.

Another important operational procedure is the limited use of radio communications to control aircraft landing or departing at Oshkosh. The NOTAM outlines when pilots should communicate and when they should just monitor their radios. Strict compliance with the published communication procedures will avoid any unnecessary frequency congestion while speeding up the landing or departure process. But every pilot should contact ATC immediately if there is any question of safety of flight or in case of an emergency. Pilots should also remember some of the aircraft flying to and from the Oshkosh area don't have radios.

One of the changes outlined in the 2000 NOTAM concerns NO RADIO AIRCRAFT (NORDO's). All NORDO aircraft pilots will have to request landing approval from Oshkosh tower by landing within 30 minutes of the Wittman Regional Airport at Oshkosh and telephoning Oshkosh tower to coordinate their arrival and to obtain their landing approval. Radio-equipped aircraft will only be accepted as NORDO arrivals due to an inflight malfunction of their radio and then only after the required telephone coordination is completed. See NOTAM page 8 for NORDO aircraft procedures.

WAYS TO MINIMIZE RISK OF MIDAIR COLLISION

All pilots need to pay attention to other traffic as they approach the Oshkosh area. Since there is such a performance mix among the different types of aircraft flying to, through, or in the Oshkosh area, there is an increased midair collision risk. One way to reduce that risk is to fly with your landing lights and beacon or strobe lights on within 30 miles or so of Oshkosh. If you are flying on an airway, you might want to extend that lights-on distance. Pilots need to be alert for traffic from any direction as they approach Oshkosh. You should also monitor the appropriate ATC frequencies listed in the NOTAM when flying within the area. Everyone should also use the appropriate altitude for your respective direction and type of flight, VFR or IFR.

VFR CROSSING OF LAKE MICHIGAN

The NOTAM outlines in detail an important safety service for pilots planning to fly across Lake Michigan. Radio coverage of the emergency frequency 121.5 MHz is available over most of the lake at a minimum altitude of approximately 4,500 feet MSL. A higher altitude is always better.

Lake Reporting Service (LRS) is provided by the Green Bay and Lansing Automated Flight Service Stations (AFSS's) for aircraft crossing Lake Michigan. Although the Lake Reporting Service is outlined in the *Aeronautical Information Manual* (AIM), it is also explained on page 30 of the NOTAM. Briefly, a LRS flight plan is a separate flight plan filed when over flying the lake. It is like a typical flight plan, but it also requires the route and time over water. Pilots must list the departure and arrival shore crossing points. The diagram in the NOTAM shows a map of the lake with VOR frequencies, radio frequencies, minimum reception altitudes, land reporting points, and the responsible AFSS's for various locations around Lake Michigan. A chart is also provided which includes distances between crossing points, frequencies, and minimum reception altitudes.

Once a LRS flight plan is activated, radio contact must be made every 10 minutes. If no contact is made within 15 minutes, search and rescue will be alerted. Pilots are responsible for activating and canceling their respective Lake Reporting Service flight plans. Pilots who have a communication failure must land and notify a flight service station as soon as possible.

Please note: A Lake Reporting Service flight plan is separate and in addition to your normal flight plan. When activating and canceling your Lake Reporting Service flight plan, please be specific as to what flight plan you are activating and closing. When departing Oshkosh, please file your Lake Reporting Service flight plan in person or by telephone at the Oshkosh FSS before departure to avoid the radio congestion caused by air filing.

Appropriate flotation gear should be carried onboard aircraft that plan on crossing the lake at an altitude below the aircraft's minimum engine-out gliding distance to the nearest shore. Pilots should compute that distance based upon the prevailing winds aloft.

ELT MONITORING EN ROUTE

Pilots flying to and from the Oshkosh area should periodically monitor 121.5 MHz en route to check for any activated emergency locator transmitters (ELT) that might be reporting an aircraft accident. If you detect an ELT signal, contact the appropriate air traffic control (ATC) facility responsible for the area you are in with the following information. You should be able to report your time, location, and altitude of when you first received the alert and when you

last heard the alert when you contact ATC.

FUEL EXHAUSTION

Another potential problem for some aircraft is fuel exhaustion. Because of the potential delay with so many aircraft operating within the Oshkosh area, including the risk of an accident on the field closing the airport for a while, all pilots should make sure they have enough extra fuel on board for the flight plus any required IFR or VFR minimums plus enough fuel for an inflight hold of at least 30 minutes or more. This is a case where the more fuel, the better. Just stay within your approved weight and balance limitations.

In addition to allowing yourself extra fuel, VFR flights should extend their projected flight plans by 30 minutes to compensate for any unexpected delays because of traffic. Pilots then need to update or extend their flight plans as necessary. The NOTAM discourages pilots from filing long distance flight plans with stops en route. Such flight plans should be filed as separate flight plans.

All pilots should review the flight plan filing and closing procedures outlined in the NOTAM.

MAINTAINING SAFE FLYING SPEEDS

Because of the mix of traffic, all pilots might want to practice flying their aircraft at its minimum *safe*—the operative word is minimum *SAFE*—airspeed, before arriving at Oshkosh. Whether you do it at home on a practice flight or en route to Oshkosh, you should be able to control your aircraft safely at its slowest recommended airspeed, its normally recommended airspeed, and at a faster than normal airspeed. The same is true for landing approach speeds. The reason is you may be mixed in with other aircraft that may be slower or faster than you. You may also need to be able to maintain your place in trail of other aircraft. *But as the NOTAM states, if you cannot safely reduce airspeed to follow slower traffic, inform ATC and do not, we repeat do not, fly at any airspeed that jeopardizes your safety of flight.*

ARRIVAL PROCEDURES

The NOTAM explains in detail, with charts and text, flight information for flying to Oshkosh. This data includes information about Chicago and Milwaukee airspace as well as airspace surrounding various towns and airports within Wisconsin near Oshkosh or over which pilots may fly en route to Oshkosh.

Included in this data are the VFR arrival procedures in effect during EAA AirVenture Oshkosh 2000. All pilots need to review these procedures before arriving in the Oshkosh general area. All IFR arrivals, except turbojet, turboprop, and air carrier aircraft should be prepared to cancel their IFR flight plan 60 NM from Oshkosh, when the ceiling and visibility at Oshkosh is reported at or above 4,500 feet and the visibility is greater than five miles. The IFR flight plan may be cancelled by the pilot any time the flight is operating in VFR conditions, or VFR conditions can be maintained through descent and landing at Oshkosh, and the aircraft is operating outside Class A airspace. After cancelling IFR, pilots must execute the VFR arrival procedure from over RIPON. Appropriate warbird aircraft may use the warbird arrival procedure from over Fond du Lac.

Because of the various planned flight activities at Wittman Regional Airport during the EAA Fly-In Convention and the special operating restrictions including when the airport is closed because of the daily air show, all pilots need to review the NOTAM for such items as airport operating hours, arrival altitudes, airspeeds, airport surface operating procedures, airport safety notes, parking notes, and other operating procedures listed in the NOTAM.

All pilots are reminded to bring their own tie-down gear.

FINAL ELT CHECK

After landing and before securing your aircraft, all pilots in radio equipped aircraft are asked to do a final radio check on 121.5 MHz to check for an inadvertent emergency locator transmitter (ELT) activation. With the large number of aircraft attending EAA AirVenture Oshkosh 2000, you can imagine the difficulty in finding the source of an inadvertent ELT signal or multiple ELT signals.

FAA SAFETY CENTER–AND–WEATHER TO GO

While at EAA AirVenture Oshkosh 2000, visit the FAA's Safety Center for all your aviation needs. The FAA Safety Center has Flight Service Station specialists available for your weather and flight planning needs, Flight Standards aviation safety inspectors from the Milwaukee FSDO to provide support, various FAA displays and exhibits as well as an ongoing schedule of FAA and industry safety presentations. Many of the presentations are given by nationally known speakers. The Safety Center is located near the FAA control tower on the Wittman Regional Airport.

SPECIAL AIRCRAFT PROCEDURES

As in past years, there are special procedures for various types of aircraft and type of flight plans. Warbirds, aircraft without radios, ultralight vehicles, seaplanes, IFR procedures and reservations, VFR aircraft and procedures, the establishment of a temporary air traffic control tower at Fond Du Lac (FLD) airport, and the use of reduced arrival and departure separation standards in the Oshkosh area are all covered in the NOTAM.

Now if the weather folks could only put out a NOTAM guaranteeing perfect weather for EAA AirVenture Oshkosh 2000. But regardless of the weather, if you are flying to Oshkosh, please plan carefully, file and activate your flight plan, take your time, remember to close your VFR flight plan upon arrival if you are going VFR, and last but not least, "Have a great time."

ADDITIONAL INFORMATION

For more information, you can contact EAA by writing to the EAA Aviation Center, PO Box 3086, Oshkosh, WI 54903-3086, or by calling (920) 426-4800. EAA's main Internet website is http://www.eaa.org.

Safety First

Preparation Currency Competency

by Patricia Mattison

Over the last couple of years my fellow Safety Program Managers have asked me to be a guest speaker and I have had the privilege of speaking on the subject of flying in Alaska to large groups of pilots across the nation. It never occurred to me that so many people wanted to fly to here. The response to the meetings was exciting. Pilot feed back was complimentary. However, the majority of pilots never realized that there was so much water to cross.

From the beginning I have suggested that pilots fly through Canada up the Alcan then cross over to the coast, if you will, to Ketchikan, Petersburg, etc. For the inexperienced, lower forty-eight pilot, the inland waterway is fine—if the aircraft has two engines or is a floatplane. What about pilots who do not have aircraft of that description? Not to mention the pilots that live in Southeast Alaska and fly on a regular basis.

For all its splendor and magnificent beauty, Alaska can be a harsh taskmaster when it comes to aviation. Even experienced pilots can and have had negative episodes while flying over the waterways that separate airports in Southeast. For the most part it is commuter airlines that carry passengers and cargo in Southeast. Experienced pilots operate air carrier aircraft. They are familiar with the terrain and the rapid changes in the weather. The quantity of passengers and cargo transported by air is astounding and is necessitated by the remoteness of the area.

Civil aviation, not for hire, makes up a small part of the flying public in the state as a whole. Yet accounts for most of the accidents. When I saw the statistics I felt sure that the pilots who were experiencing trouble were coming in from outside the state. I found through research that my supposition was wrong. The majority of pilots having accidents were from the area near to the accident site. It occurred to me that maybe I had missed the mark and the local pilots were the ones that needed the education. Pilot error is the one most prevalent cause for the accident rate, followed by weather related, then mechanical issues.

It is imperative that the pilot flying in Southeast Alaska, as well as the rest of the U.S., is competent, current and think like a pilot—not an airplane driver. There are no places to pullover to the side of the road if an unforeseen situation arises. Pre-planning and caution are the two items most forgotten by the pilot. Forgetting to close a door can cause enough distraction to make a pilot forget to fly the airplane, if only for a moment. It could be that the moment is a critical one. Fuel management, or a lack of, can cause an engine to quit. Poor judgment on landing approach caused seven out of fifteen accidents in Southeast last year.

What can you as a conscientious pilot do to rectify the situation? Plan as carefully as the pilots flying to Alaska for the very first time. That pilot finds out everything about the area he or she plans to fly in. All of the nuances that are needed to make a safe flight: Contingency plans, if weather precludes continuation of that flight, and a flight plan filed to assure safe rescue in the event of an emergency landing, especially this time of year when weather can turn in a heart beat.

Lastly, get some flight training each year. Don't rely on a Biennial Flight Review to keep you competent to fly. Now is the time to plan your next flight, and the one after that, and the one after that.... **Preparation. Currency. Competency**.

Safe flight. That's what it is all about.

Patricia Mattison is the Safety Program Manager at the Juneau Flight Standards District Office.

Getting Ready

Preparing students for their practical test

by J. C. Boylls, MCFI

For most pilots, the greatest challenge they face is the practical test. That meeting with a designated pilot examiner (DPE) or FAA inspector can be daunting. "Am I good enough?" they think. Flight instructors often have similar thoughts because how their student does reflects on them. "Have I prepared my student well enough?"

To help you—the flight instructor—prepare your students through the practical, let's look at what the Practical Test Standards (PTS) are meant to do. In Chapter VII, "Evaluation," the *Aviation Instructor's Handbook*, AC 60-14, says, "If students demonstrate the ability to perform selected parts of a skill [emphasis added] for which they are...trained, it is assumed that they will be able to perform the entire skill. In other words, performance testing is a sampling process. It [is] a carefully selected part of a complete doing process typical of the skill for which training is being given."

This definition suggests that a practical test samples the skills and knowledge a person needs to be a pilot. In other words, the PTS selects portions of everything a person must know and do, and it's the examiner's job to decide if an applicant can do everything else.

But the examiner's judgement of performance isn't totally subjective. The examiner assesses the applicant's ability against the definition of a "satisfactory performance," which is given in Federal Aviation Regulation (FAR) §61.43, "Flight tests: General Procedures," and the PTS introductory pages. An applicant gives satisfactory performance when he[she] executes procedures and maneuvers within the aircraft's capabilities and limitations; executes emergency procedures and maneuvers appropriate to the aircraft; pilots the aircraft with smoothness and accuracy; exercises judgement; applies his[her] aeronautical knowledge; and shows that he[she] is the master of the aircraft, with the successful outcome of a procedure or maneuver never seriously in doubt.

If the applicant fails any of the required pilot operations in accordance with the applicable provisions of FAR §61.43, the applicant fails the flight test and isn't eligible for the certificate or rating until he[she] passes the operations he[she] failed. Either the examiner or the applicant may discontinue the test when the failure of an operation makes the applicant ineligible for the certificate. If discontinued, the applicant is entitled to credit for the pilot operations he[she] has successfully performed.

The PTS also defines "Unsatisfactory Performance." In part, it says, "If, in the judgment of the examiner, the applicant does not meet the standards of performance of any TASK performed, the associated AREA OF OPERATION is failed and therefore, the practical test is failed.... Typical areas of unsatisfactory performance and grounds for disqualification include: Any action or lack of action by the applicant that requires corrective intervention by the examiner to maintain safe flight. Failure to use proper and effective visual scanning techniques to clear the area before and while performing

maneuvers. Consistently exceeding tolerances stated in the Objectives. Failure to take prompt corrective action when tolerances are exceeded."

In other words, if an applicant scares me—doesn't scan for traffic and clear the area, consistently exceeds maneuver tolerances, and doesn't fix errors when he[she] gets outside the tolerances—the test is over. Remember, the PTS's plus-or-minus tolerances are predicated on smooth air and a good flying day. Examiners have some leeway to allow for turbulence, but we know the difference between choppy air and ham-handedness.

During the test, I'm an observer, not your friendly flight instructor. Usually, I tell applicants to treat me as a "knowledgeable passenger," but that does not mean they should forego giving me the passenger briefing required by FAR §91.107 (and the PTS). As an examiner I must ensure that your applicants meet the knowledge and skill tolerances for every Task in every Area of Operation. During the oral exam I must, to the greatest extent possible, test an applicant's correlative abilities rather than his rote recitation of facts. During the flight I must evaluate his ability to clear the area and examine his collision avoidance procedures besides how he performs the maneuvers.

Examiners must develop and use a written "plan of action" to give practical tests; mine is three pages long. On it are the applicant's record of eligibility to take the test and the "rules" of the test. First among them is that the applicant, regardless of the certificate or rating sought, must acknowledge that he[she] is the pilot in command.

FAR §61.47, "Flight tests: Status of FAA inspectors and other authorized flight examiners," makes this quite clear. What this really means is that whatever happens, good or bad, it's the applicant's fault, not mine, including violating a regulation, bending the airplane—or worse. Naturally, no examiner will intentionally ask an applicant to do anything that will hurt us or the plane. But examiners, contrary to the thoughts of some, are human. They can misspeak or use words differently than the applicant's instructor.

If you, the instructor, can implant one idea in your student's head before a practical test, it should be that he[she] is the pilot in command—and that the PIC is totally responsible for the safety of the flight, even though there's an examiner sitting next to him[her]. Bolster your student's resolve to ask the examiner about anything that seems unclear, illegal, or unsafe. If anything, asking questions is a sign of good judgment.

What is the applicant's job during a practical test? To demonstrate his[her] knowledge and skill to the examiner. The examiner will use the PTS to decide if the applicant can do it all, and if the applicant knows and can do all that the PTS requires—hey, is there a problem here? Reality time: Can anyone know everything? Hardly. If the applicant and the examiner exchanged places, it wouldn't be long before he[she] found holes in his[her] knowledge; with me, your questioning would shoot me down within a few minutes—I know 'cuz it happens to me all the time.

What is the flight instructor's job in preparing applicants for practical tests? The PTS says this: "An appropriately rated flight instructor is responsible for training an applicant to acceptable standards in all subject matter areas, procedures, and maneuvers included in the TASKS within the appropriate practical test standard. Because of the impact of their teaching activities in developing safe, proficient pilots, flight instructors should exhibit a high level of knowledge, skill, and the ability to impart that knowledge and skill to students. Additionally, the flight instructor must certify that the applicant is able to perform safely as a commercial pilot and is competent to pass the required practical test."

This couldn't be better said. As a CFI, you're responsible for everything your student must know and do, including his[her] application, logbook, and airplane records—everything! When you endorse a student's logbook and application for a certificate or rating, you're testifying that the applicant knows and can do it all. As you work with your student, you must ensure that you cover all the material and skill areas, and that your student knows how to apply them. Then, you should review them with your student to be sure yourself. Finally, you should help your applicant organize his[her] material so he[she] can really impress the examiner when he[she] takes the test. In my experience, around 75 percent of all applicant failures are the result of a CFI who didn't do his[her] job. From my perspective, it's easy to tell, too.

Instructors can't vaccinate their applicants against "checkitis" because no one is immune. (Remember your initial CFI ride?) The best you can do is try to ease the applicant's mind so he[she] doesn't become a self-fulfilling prophecy. Make sure he[she] understands that the FAA doesn't issue examiners a forehead-shaped stamp that says FAILURE. And that anyone who's been in aviation for some time and said he[she]'s never had a pink slip or a down check is probably stretching the truth (for example, I've had two pinks in my career). As you know from your tests, if the applicant is prepared, checkitis usually fades once the test begins, and a little nervousness is good because it stimulates the thought process.

Finally, tell your applicants never to stop—unless the examiner says "stop." Tell your applicant not to dwell on their supposed mistakes.... The applicant's total job is to concentrate on flying the aircraft.

The day before your student takes his[her] test, tell him[her] he[she]'s prepared because he[she]'s received the best education money can buy. Tell him[her] to go home, find his or her significant other, have a good time (without alcohol!), get a good night's sleep, and eat a good breakfast the next morning. Then go knock that examiner down and don't let him[her] up until he[she] says, "You passed—and congratulations on one of the better jobs I've seen!" (As an examiner, that makes my day, too!)

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• Pilot Flight Time

Some time ago I wrote looking for input on FAR § 1.1 that defines "pilot flight time." I said that some of our pilots claimed "flight time" included start, warm-up, taxi, runup, and further taxi (all under the assumption that this time is "for the purpose of flight") while the purists in the group claimed that flight time didn't even start until power was applied at the end of the runway.

According to FAR § 1.1, does flight time include start, warm-up, taxi to the run-up area, further taxi to the runway, etc. or does "moving under its own power for the purpose of flight" begin only when the aircraft is lined up on the centerline beginning its take-off roll?

The argument, of course, is that since most GA aircraft begin charging for the airplane once the engine starts, most pilots have decided to log what they pay for.

But there is another group of pilots who say that warm-up and taxi time is not flight time.

Has the FAA explained the definition we find in FAR § 1.1?

Fred C. Smyth
Via the Internet

Flight time is as defined in FAR § 1.1. FAR § 1.1, states in part, "Flight time means pilot time that commences when an aircraft moves under its own power for the purpose of flight and ends when the aircraft comes to rest after landing; or ..." The references are FAR §§ 1.1 and 61.51. A more common definition is "Block-to-Block" time. So in essence, flight time means:

Start up: No.
Warm-up: No.
Taxi: Yes.
Further taxi to the runway, etc.: Yes.
The aircraft moves out onto the runway, and begins the takeoff roll: Yes.
En Route: Yes.
Landing and roll out: Yes.
Taxi in to parking: Yes.
Engine Shut Down: No.

* What's in a Name?

That was a really great photo on the back cover of our May/June issue. Only there was one problem. Yes, it is a Piper, but it's a Seminole, *not a* Seneca.

from multiple calls

Thanks to everyone who caught the error and called or e-mailed us. As you can see by the photos, there is a definite difference between the two airplanes, especially in the tail area.

• Tell Me It Ain't So

I am writing about the May/June 2000 *FAA Aviation News* photo on page 20 with the caption "Golden Knights 8-way over Bermuda. (US Army Photo by Gary Walker)

The problem is my concern about the jumpers being the legal distance from clouds as required by FAR §105.29. The required distance is 1,000 feet above—"*maybe for a moment*," 500 feet below—"*maybe in a few moments*," 2,000 feet horizontal—"*unlikely*," and may not pass into or through a cloud—"*probably*."

I think a violation appears to be documented by the U.S. Army Photo. Then it is printed in *FAA Aviation News* in an article about FAA attorneys doing a tandem jump.

Tell me it ain't so!

FAR §105:11(c), sections 105.13 through 15.17 and 105.27 through 105.37 of this subpart do not apply to a parachute jump made by a member of an Armed Force:

(1) Unless this is not over the United States, or it is over or within a restricted area when that area is under the control of an Armed Force, or

(2) In military operations in uncontrolled airspace.

Is Bermuda in the United States?

There has to be some LEGAL explanation, right? If there was a reason this jump was legal, it might have been prudent to explain the reason in the article.

I am currently doing violations for civilian skydivers jumping through clouds, and I feel rather silly/stupid for trying to enforce the rules when something like this shows up in our FAA publication.

Chuck Cox
Seattle FSDO

An FAA aviation safety inspector should never feel silly or stupid enforcing FAA regulations.

The last time we checked Bermuda was not part of the United States. As you noted, FAR § 105.1, Applicability, states in part (a)"This part prescribes rules governing parachute jumps made in the United States...."

As you pointed out, this jump was made in Bermuda by military jumpers in accordance with applicable local regulations.

We want to thank you for reminding everyone of the U.S. parachute cloud requirements and flight visibility requirements contained in FAR §105.29, Flight visibility and clearance from clouds requirements.

As you noted, the requirements are three statute miles flight visibility and distance from clouds of 500 feet below, 1,000 feet above, and 2,000 feet horizontal at both 1,200 feet or less above the surface regardless of the MSL altitude, and the same requirements exist for more than 1,200 feet above the surface, but less than 10,000 feet MSL. At more than 1,200 feet above the surface and at or above 10,000 feet MSL, the flight visibility becomes five statute miles, and the distance from clouds becomes 1,000 feet above and below and one mile horizontal.

• No Hard Copies

I am a newcomer to aviation. I am to take my practical test in two days for my private pilot certificate. It is a relief that Congress has finally passed the legislation to free up the money that was supposed to be for the FAA. Still, it is stunning that the FAA, which Congress has charged with maintaining public safety regarding aviation, has been intentionally underfunded by diverting the funds elsewhere, and let relatively inexpensive safety items, like *FAA Aviation News*, lapse for lack of funds.

One of the instructors showed me a back issue, and I was convinced that every pilot should be reading it. I hope the new legislation lets you get back in business.

Ralph Swank
Tampa, FL
via the Internet

As you now know, funds were approved for the magazine. Thank you for your support of the magazine. I hope you are now a new private pilot. If so, congratulations on your accomplishment.

FAA AVIATION NEWS welcomes comments. We may edit letters for style and/or length. If we have more than one letter on the same topic, we will select one representative letter to publish. Because of our publishing schedules, responses may not appear for several issues. We do not print anonymous letters, but we do withhold names or send personal replies upon request. Readers are reminded that questions dealing with immediate FAA operational issues should be referred to their local Flight Standards District Office or Air Traffic facility. Send letters to H. Dean Chamberlain, FORUM Editor, FAA AVIATION NEWS, AFS-805, 800 Independence Ave., SW, Washington, DC 20591, or FAX them to (202) 267-9463; e-mail address:

Dean.Chamberlain@faa.gov

FAA COMPLETES DEPLOYMENT OF NEW SURVEILLANCE RADAR

In a significant milestone in the modernization of the National Airspace System, the Federal Aviation Administration (FAA) recently completed the final installation and acceptance of innovative air surveillance radar technology that will enhance air safety through improved position information and weather detection.

Air Route Surveillance Radar (ARSR-4) replaces obsolete radar with all-solid-state, long-range, three-dimensional radar providing aircraft position information to the FAA, Air Force, Navy, and Customs Service. The ARSR-4 also provides weather data to both the FAA and National Weather Service. The 12-year ARSR-4 program was a joint FAA/Department of Defense (DOD) initiative.

Completion of this key phase of the air traffic control system is a significant step in building the transportation system of the 21st century, U.S. Transportation Secretary Rodney E. Slater said.

The ARSR-4 program demonstrates that innovative technology can make our aviation system both safer and more efficient.

The ARSR-4 provides several unique capabilities not found in other long-range radar. It can detect a one-square-meter object out to 250 nautical miles, a 50 nautical mile increase over previous long-range radar models. The square-meter target can even be detected through severe weather conditions including heavy ground and sea interference as well as large bird migrations. The superior target detection enhances the ability to identify hostile intruders and drug smugglers. It also improves weather detection by increasing weather processing from two to six levels. The improved weather information will increase controller and pilot awareness of their operating environments.

The program consists of 43 operational systems deployed around the periphery of the continental United States as well as in Guam, Hawaii, and Guantanamo Bay, Cuba. The 44th system is used for support at the FAA Academy at the Mike Monroney Aeronautical Center in Oklahoma City. The program began with a contract award in 1988 to Northrop Grumman. The first system was commissioned in April 1996 in Tamiami, Fla. Total program costs were $800 million, half of which was paid by DOD.

FAA LAUNCHES FIRST OCEANIC DATA LINK SERVICES OVER ATLANTIC

In a move that increases the safety and efficiency of oceanic air travel, the Federal Aviation Administration (FAA) has initiated use of electronic air/ground communication services for aircraft operating over the Atlantic Ocean. The same system has been operating for aircraft flying over Pacific Ocean airspace for more than a year.

The FAA's New York Air Traffic Control Center began initial operations in March of the Multi-Sector Oceanic Data Link System, which provides a means for air traffic controllers to have two-way electronic communications with aircraft equipped with data link. This technology is designed to eliminate the need for voice communication between data link-equipped aircraft and air traffic controllers, improving the reliability and timeliness of message delivery.

In conjunction with aircraft equipped with the Future Air Navigation System (FANS—an international standard for avionics that are compliant with Oceanic Data Link), the Oceanic Data Link system provides a means to automatically check pending clearances for conflicts, while allowing the flight crews to automatically load flight clearances they have received into the aircraft's Flight Management System. The Oceanic Data Link system also provides the controllers with an integrated interface to the flight data processor and addresses the existing high frequency communications problems with aircraft, such as frequency congestion, transcription errors, and lack of timeliness.

Oceanic controllers began using the system in limited operations at a single sector in March 2000. As controllers become more familiar with Oceanic Data Link, operations will expand to include full system capabilities. Full operations are planned at all Caribbean sectors later this year. Once full operations in the Caribbean are in effect, operation of the system will transition to New York's North Atlantic sectors.

Other North Atlantic air traffic service providers are planning the initiation of FANS-based data link trials later this year. New York's early lead in those efforts will be important in the realization of the goal of a seamless data link operation in Atlantic airspace.

NEW FAR PART 61 Q&A WEBSITE

There is a new website for the FAR Part 61 questions and answers published on online. FAR Part 61 questions submitted to FAA Headquarters and the answers provided are now listed at the following new location. To access the site, please use the following directions: Access the Internet at http://afs600.faa.gov. You then need to go to the area noted as [SEARCH] on the left side of the page and click on "AFS640." Next click on subject noted as "Other." Next, click on the caption area noted as "FAQ" to arrive at the question and answer documents.

FAA NAMES STEVEN WALLACE DIRECTOR OF ACCIDENT INVESTIGATION

The FAA has named 24-year FAA veteran Steven B. Wallace as director of the agency's Office of Accident In-

vestigation. In his new position, Wallace will oversee all FAA aircraft accident investigations and all activities related to the National Transportation Safety Board. The Office of Accident Investigation examines aviation accidents and incidents to detect unsafe conditions and trends and to coordinate any necessary corrective actions.

From 1991 until recently, Wallace was the FAA's senior representative at the U.S. embassy in Rome. During the period 1984-91, Wallace was manager of the standards staff in the FAA's Transport Airplane Directorate in Seattle. He began his FAA career in 1976 as an attorney in the agency's Eastern Region counsel's office in New York, and in 1979 he moved to the Northwest Mountain counsel's office in Seattle.

Wallace comes from an aviation family. His father flew as a Pan American Airways captain on the full line of Douglas aircraft from the DC-3 through the DC-8, and on the Boeing *Stratocruiser*. His mother was Pan American's first female celestial navigation instructor, a position she earned in 1942. Wallace has been a licensed pilot since 1977. He currently holds a commercial pilot's license with multiengine and instrument ratings.

EXECUTIVE JET MANAGEMENT'S SIXTH DIAMOND AWARD

Executive Jet Management(EJM), Inc., of Cincinnati, OH, has been presented with the FAA's Diamond Award for training excellence for the sixth consecutive year. The FAA's Aviation Maintenance Technician Awards Program provides incentives for companies involved full-time in the business of maintaining or repairing aircraft to participate actively in training their employees. EJM received the employer Diamond Award for having 25 percent or more of its maintenance technicians qualify for an individual training award in 1999 and for the company's Grey Owl human factors safety training program.

The Grey Owl program enables EJM employees and supervisors to recognize co-workers attitudes and working relationships and how they affect job performance. All EJM line mechanics have been through Grey Owl training at least once and 65 percent have participated in the training program three times, according to Richard Williams, EJM's director of maintenance.

"What the FAA Diamond Award means is that EJM is putting through a great deal of effort and financial support to make sure that its people are trained properly," Williams said. "EJM has already qualified for the year 2000 FAA Diamond Award which will be our seventh year in a row....To increase the incentive for management to fund training, the FAA recognizes employers like EJM who take a productive role in training its technical work force."

The requirements to receive the Diamond Award are more demanding than the requirements for any of the other four award phases in the technician and employer awards available from the FAA, according to Williams.

"EJM has had 100 percent of its maintenance employees participate in training for six straight years," Williams said. "It is difficult for a company as large as EJM to do this consistently because of the number of training awards necessary to hit the Diamond level." EJM is a leading national provider of aircraft management services and worldwide charter service, with its repair station employing 62 line mechanics and seven supervisory and support personnel.

INTERNATIONAL AEROSPACE HALL OF FAME ANNOUNCES 2000 HONOREES

Each year the San Diego Aerospace Museum's International Aerospace Hall of Fame honors persons, living and deceased, who have made significant and lasting contributions to the advancement of aviation and the exploration of space. This year's honorees are:

* Katherine Stinson soloed in a Wright Model B aircraft in 1912 and became the fourth woman in the U.S. to qualify for a Federation Aeronautique Internationale pilot license. She was also a woman of many "firsts."

* Frederick Wallace Smith was a decorated Marine Corps pilot in Vietnam, who eventually lead a revolution in national and international air freight operations—the result is known as Federal Express.

* Sir Richard Branson's various business successes include Virgin Atlantic Airways, currently Britain's second largest long haul airline. He and Pers Linstrand were the first to fly the Atlantic in a hot air balloon in 1987 and the first to fly the Pacific in any type of balloon in 1991.

NEW WEATHER SERVICE WEBSITE AVAILABLE

The National Weather Service and FAA have established a new aviation website. The Aviation Digital Data Service (ADDS) website is designed to provide pilots a fast and easy way to review aviation related weather data. The Internet address is <http://adds.awc-kc.noaa.gov>

Editor's Runway

from the pen of Phyllis-Anne Duncan

Countdown to 2003

There is a commercial currently running on television which struck a chord with me—I don't remember the product, but its opening sequence appealed to me. The picture is a grainy movie of one of the Wright Brothers' earliest flights, and the voiceover narration says, "If we didn't go here..." The next shot is of an astronaut's bootprint in the dust of the Moon, and the narrator finishes with, "We wouldn't have gone here." I tuned out the remainder of the commercial to focus just on that concept. The dream of powered flight had eluded humankind for centuries until time and place and destiny—with a bit of history mixed in—all came together on a windy sand dune one December day in the early years of this century. Then, those same factors converged again in the final third of this century when humans walked on another world. Amazing. And did the Wright Brothers ever consider that barely 100 years after their fragile aircraft flew that we would be poised on a threshold to live in space or to walk on the surface of Mars? Because they were visionaries, I'd like to think so.

Consider that 97 years is a nanosecond or less in the march of time, and we have gone from wood and cloth aircraft to composite material aircraft that are lighter and stronger than Orville and Wilbur could have imagined. We have gone from low-level flight over sand dunes to regularly soaring into space on powerful rocket engines. We have gone from gasoline powered engines to ion engines for spacecraft, once only the stuff of science fiction. All this in less than a century. Those of us born in the last half of the century take this for granted and are a bit blasé sometimes about it. That makes me think of my grandmother, who, if she had lived, would turn 100 just 11 days after the 100th anniversary of the Wrights' flight and who watched television pictures of Neil Armstrong and Buzz Aldrin and marveled at it all. I think as well of my goddaughters, born after 1969, for whom all this is merely history.

As a fan of speculative fiction, the thought naturally followed, what if the Wright Brothers had failed, or all the others who were trying at the same time had failed? Where would we be now? Because humans are innovative creatures, I know it would have happened eventually, but would we have walked on the Moon in 1969? Would we have had people live months at a time in space? Again, eventually, but where would we have ended up on the technology scale of evolution?

This is indicative of what aviation has meant not just to those of us who are aviators but society as a whole. When I teach private pilot ground school, I try to tie in the concept of innovation in aviation and how the creative, human spirit wasn't satisfied with a fabric-covered aircraft that flew for less than a minute, that all the variety we have now in commercial aircraft and kit aircraft is just an extension of an idea that first bloomed in the minds of our earliest ancestors who watched birds and envied them.

In the coming years until 2003 probably millions of words will be written about that one seminal event of this century ('cause, remember, the new one doesn't really start until NEXT year), and most of them will do far better justice to the time and the event and the people who made it happen than mine do. There will be many celebrations and commemorations and speeches, ad infinitum, but just remember probably the highest tribute we can pay the efforts of hundreds of striving minds which culminated on December 17, 1903, is to continue to take to the sky in our aircraft and remember how we got there.

'Til next time...

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